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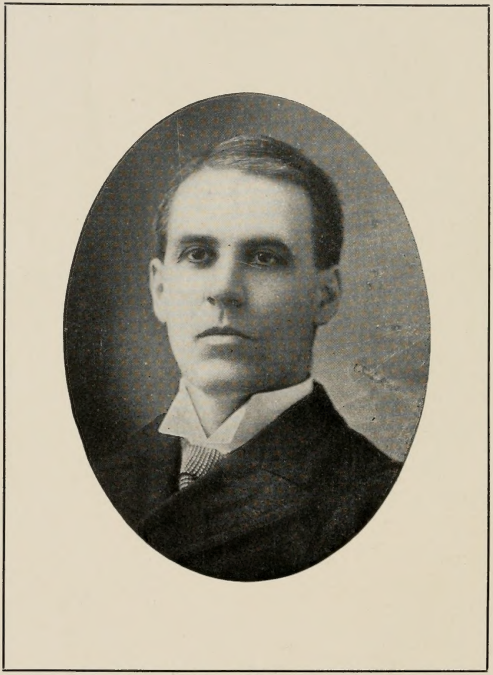
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PRACTICAL AND POPULAR ENTOMOLOGY.—No. I.

THE PEAR-TREE PSYLLA AND HOW TO DEAL WITH IT.

BY GEORGE E. FISHER, BURLINGTON, ONT.

[At the last Annual Meeting of the Entomological Society it was decided that a series of articles should be published monthly in this magazine of a popular or practical character, in order that in each issue there should be something of interest to the general reader in addition to the papers of a technical and purely scientific character. It is intended that the series shall cover a wide range, and include articles which will be useful to beginners in entomology, and also to the fruit-grower, farmer and gardener, as well as to the many students and teachers who are now interested in Nature-study. The following article is by Mr. Fisher, who was for several years Inspector of Scale-insects for the Province of Ontario, and who has a practical and intimate knowledge of many injurious insects, and of the most effective methods of dealing with them.—ED. C. E.]

Several instances of disastrous and even fatal effects to valuable pear orchards from being attacked by the Psylla have come under my observation, as well as entirely satisfactory results from treating the trees.

The life-history and habits of injurious insects must be accurately determined before we can know just how to deal with them. A knowledge of the habits of such insects will also often enable the farmer to so manage his land and crops that the insects are placed under unfavourable and even destructive conditions.

The Psylla winters in the full-grown or perfect state, a minute brick-red fly, about one-eighth of an inch in length. From the broad head the body tapers to a point at the caudal extremity. There are two pairs of large transparent wings, which when closed cover the body. The thighs are abnormally developed, which enables it to jump a long way; hence the name "Pear-tree Flea-louse." In form this insect is the counterpart of the Dog-day Harvest fly (Cicada) in miniature (Fig. 1).

During the winter it secures shelter in the crevices of the bark on the trunks and large limbs of the trees, in nearby rubbish, or wherever it can find protection; hence the advantage of clean culture, in which case it will be confined to the trees. The small lemon-coloured eggs are laid about the middle of April, and hatch about the middle of May, according to weather conditions (Figure 2). There are probably four broods in a season. When the nymphs appear, if there be no foliage, they make their way into the opening buds. They secrete large quantities of honey dew, which frequently drips from the leaves, and gets over the whole of the tree and fruit, in which a black fungus develops.



FIG. 1.—The Pear-tree Psylla—greatly magnified.

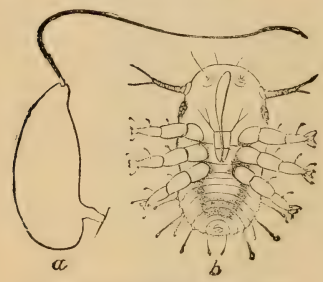


FIG. 2.—Pear-tree Psylla—*a* egg, *b* nymph—greatly magnified.
(Marlatt, U. S. Dept. of Agriculture.)

There is difficulty in treating the Psylla during the summer. Except immediately following a heavy rain, the nymphs are usually so completely enveloped with honey dew that spray will not reach them, and the mature insects are so active that when spray strikes a tree they instantly fly away, and do not return until the spraying is discontinued.

An ounce of crude petroleum in the proportion of 1 in 16 (1 gal. of petroleum in 16 gals. of emulsion), has in my experience proved the most satisfactory in case a treatment must be given in summer, but I would depend upon a very thorough application of lime and sulphur (lime 30 lbs., sulphur 20 lbs., in 40 gals. of wash, cooked two hours), made in March, to wipe out the pest. At this season there are no eggs. The overwintered adults are very sluggish, not at all like those of the summer broods, and these alone are present. If the wash be driven well into all of the cracks of the bark the destruction of the insects will be complete.

Lime alone will destroy Psylla perhaps as completely as with sulphur added, and will go a long way in cleaning off the black fungus, but lime alone will not destroy scale insects, and these are invariably present. Whether it be lime, or lime and sulphur that is used, the wash must be liberally applied, for it will not diffuse, but remains where it strikes the tree, and if the Psylla is to be killed it must be hit.

NEW HYMENOPTERA FROM THE PHILIPPINE ISLANDS.

BY WILLIAM H. ASHMEAD, M.A., D. SC., WASHINGTON, D. C.

The good work on the Hymenopterous fauna of the Philippine Islands, begun by Father W. A. Stanton, S. J., is being continued by Father Robert E. Brown, S. J., and I have now the pleasure of describing below *two* new genera and *twelve* new species captured by him in the Observatory Garden at Manila.

Family XXVIII.—VESPIDÆ. Icaria, Saussure.

Icaria Cayayanensis, new species.—♀. Length, 6.6 to 7 mm. General colour brown, marked with yellow and black. The inner orbits from the sinus of the eyes downwards, the clypeus, except a bowl-shaped black spots on its disk, the cheeks, a line along the hind orbits, the scape of the antennæ, its pedicel beneath, and the first two joints of the flagellum beneath, the mandibles, except a spot at base and the teeth which are black, the upper part of the pronotum dilated laterally towards the hind angles, a rounded spot on the mesopleura beneath the tegulæ, the tegulæ, a spot at the base of the insertion of the hind wings, a broad longitudinal band on the metathorax extending on each side to the insertion of the hind coxæ and separated by a triangular black spot in the central depression, two lines on the mesonotum, two large quadrate spots at the base of the scutellum, two spots at the base of the postscutellum, most of the coxæ, except a black spot at the extreme base and on their posterior face, all femora, except the blackish stripes beneath and behind, the tibiæ, except the apices of the middle tibiæ and a large brownish-black blotch towards the apex of the hind tibiæ, all tarsi, the apical margin of the first, second and third abdominal segments and large oval spots at the base of the second dorsal segment, are yellow; the suture at the base of the clypeus, a spot back of the insertion of the antennæ, the flagellum, the ocelli, the occiput, the front face of the prothorax, broad bands on each side of the mesonotum, the mesopleura, the metapleura and the abdomen, except as already noted, are black. The wings are hyaline, but with a fuscous spot occupying the apical half, or more, of the marginal cell; the stigma is brownish-yellow, the veins being brown-black or black.

Type.—No. 8126. U. S. N. M.

Manila (Father Brown). I have this species from other places.

Family LIV.—DIAPRIIDÆ. Diapria, Latreille.

Diapria Philippinensis, new species.—♂. Length, 1.5 mm. Polished black, shining and impunctate, the scutellum with a large

depression across the base, the metanotum with a triangular carina at its basal middle, the legs honey-yellow, the posterior pair with a reddish tinge, the collar, the metapleura and the petiole of the abdomen clothed with a whitish pubescence; the antennæ are 14-jointed, much longer than the whole insect, the scape and pedicel being testaceous, the flagellum being black, with the joints long, nodose-pedicellate and with whorls of long hair; the wings are subhyaline, ciliated, the marginal fringe long.

Type.—No. 8127, U. S. N. M.

Manila. Two specimens received from Father Brown. This is the first species in this family to be recorded from the Philippines. The wings may be *clear* hyaline, as the specimens were in alcohol, and the slight dusky appearance of the specimens may be due to dust.

Family LVIII.—Figitidæ.

Subfamily Eucoilinæ. Hexamerocera, Kieffer.

Hexamerocera Philippinensis, new species.—♀. Length, 0.9 mm. Polished black and shining, impunctate, the mandibles testaceous, the legs, including the coxæ, wholly brownish-yellow; the antennæ are 13-jointed, with the six last joints enlarged, oval, brownish, the scape and pedicel being reddish, the basal joints of the funicle being more yellowish; the first joint of the funicle is about thrice as long as thick, those beyond small, moniliform, but slightly increasing in size to the club, the scutellum at the sides and the metathorax are finely rugulose; the cup of the scutellum is oval, with a few punctures on its disk; the abdomen has a thick hairy girdle at its base. Wings hyaline, ciliated, the veins yellowish, the marginal cell closed.

Type.—No. 8128, U. S. N. M.

Manila. Described from a single specimen received from Father Brown. This is the first Eucoiline to be discovered in the Philippines.

Family LXVII.—Encyrtidæ. Ooencyrtus, Ashmead.

Ooencyrtus papilionis, new species.—♀. Length, 0.7 mm. Head and thorax æneous black, the head in front with a bluish tinge, the abdomen testaceous, the antennæ and the legs, including all coxæ, pale yellowish. The wings are hyaline, the veins yellowish, the marginal vein punctiform, the stigmal vein short, ending in a minute, rounded knob. The flagellum is subclavate, thickened towards apex, the first three or four joints a little longer than thick.

♂.—Length, 0.6 mm. Differs in having the head and thorax dark blue, the eyes very large, whitish, the abdomen smaller and triangular in

outline, testaceous, but with the lateral margins and the tip brownish; the flagellum is nearly filiform, finely pubescent, with the joints shorter than in female.

Type.—No. 8125, U. S. N. M.

Manila. Described from 2 ♀s and 1 ♂, bred by Father Brown from the eggs of a butterfly, *Papilio*, sp.

APTERENCYRTUS, new genus.

This new genus is proposed for a minute wingless ♀ Encyrtine, quite characteristic, and easily characterized. It falls into my tribe *Mirini*, and may be placed in my table of genera, Classification of the Chalcidoidea, p. 301, No. 25, between *Coccophoctonus* and *Phænodiscus*.

25. Wingless forms.

Antennæ inserted close to the mouth, the scrobes distinct, the scape slender, the flagellum clavate, the funicle joints minute, widening towards the club, not longer than wide, the three last joints wider than long, the club enlarged; scutellum with a small tuft of bristles towards apex..... Apterencyrtus, Ashm., g. n.

Apterencyrtus pulchricornis, new species.— ♀. Length, 0.6 mm. Head dark blue, smooth, impunctate, the eyes whitish, converging slightly anteriorly; thorax æneous black, the mesonotum clothed with sparse, silvery-white hairs, the scutellum shagreened, with a small tuft of black bristles, the hind angles of the metathorax acute, the abdomen smooth, black, but with an æneous tinge in certain lights; antennæ tricoloured, the scape and pedicel beneath, and the funicle snow-white, the scape above towards apex and the pedicle above brown, the club black; the front and middle legs are snow-white, but the middle femora just before apex and the middle tibiæ near the base have a narrow brown annulus; the hind coxæ, and apical two-thirds of the hind femora are metallic brown-black, while the trochanters, base of femora and rest of the legs are snow-white.

Type.—No. 8120, U. S. N. M.

Manila. (Father Brown.)

Family LXXI.—EULOPHIDÆ.

Subfamily III.—Tetrastichinæ. Tetrastichoides, Ashmead.

Tetrastichoides Manilensis, new species — ♀. Length, 1 mm. Head and thorax blue-black, impunctate, the axillæ and the abdomen æneous black; the scape of the antennæ and the legs, except the coxæ and the basal two-thirds of the hind legs, which are æneous black, are yellowish-white, the flagellum is brown-black, subclavate, finely pubescent, the

funicle joints increasing in size, the last being a little more than twice as long as thick.

Type.—No. 8129, U. S. N. M.

Manila. Two specimens taken by Father Brown.

Family LXXVI.—Ichneumonidæ.

Subfamily V.—Ophioninæ.

Tribe V.—Campoplegini. Charops, Holmgren.

Charops papilionis, new species.—♂. Length, 10.5 mm. Opaque black, closely punctured; the apex of the first and second dorsal abdominal segments, and the following are entirely ferruginous; the first two joints of the antennæ, except a blotch above, the mandibles except the teeth, the tegulæ, the palpi, the front and middle trochanters, the apical joint of the hind trochanters, the extreme apex of the front femora, the front and middle tibiæ and tarsi except the last joint, are ivory-white; the hind legs, except as noted, are black, the hind tibiæ, except towards apex and at extreme base, where they are black, are ferruginous, the apical joint of the hind trochanters being ivory-white. Wings hyaline, with the lanceolate stigma and the veins, except the costal vein at base, which is white, black.

Type.—No. 8142, U. S. N. M.

Manila. Described from a single specimen bred by Father Brown from a chrysalis of *Papilio agamemnon*. This species shows some affinity with *Charops erythrogaster*, Ashm., described from Ceylon, but it is much larger and quite differently coloured.

Family LXXVII.—Alysiidæ.

Subfamily II.—Alysiinæ. Aclisis, Förster.

Aclisis pleuralis, new species.—♀. Length, 1.8 mm. Brownish-yellow, with dark purplish-brown eyes, the flagellum black, with several of the apical joints snow-white, the meso- and metapleura, and the abdomen above, except the first segment, black; the legs are pale yellow, but with the front trochanters, the middle legs entirely and the hind coxæ, hind femora and base of hind tibiæ, ivory-white. Wings hyaline, pubescent, the veins light brownish.

Type.—No. 8130, U. S. N. M.

Manila. This is the first species in this family to be recorded from the Philippine Islands, and was captured by Father Brown in the Observatory Garden.

Family LXXVIII.—Braconidæ.

Subfamily VIII.—Sigalphinæ. Fornicia, Brullé.

Fornicia annulipes, new species.—♂. Length, 4.5 mm. Black, the thorax punctured, the mesonotum with a distinct median carina, and with a smooth, almost impunctate, space on each side of the carina posteriorly, and again near the insertion of the wings; the scutellum, the mesopleura, and the metathorax are more coarsely punctured or rugulose; the very short pronotum is acutely toothed at each anterior angle; the abdomen has only three visible segments and is coarsely longitudinally rugulose, the first segment with a distinct median carina its entire length, the last segment at apex medially excised, with its margin rimmed. The head is small, transverse, hardly two-thirds the width of the thorax, and is smooth and shining; the pubescent eyes are whitish; the ocelli are pale, and arranged on a slight curved line; the palpi, except the first two joints, the front knees, tibiæ and tarsi, the tips of the middle tibiæ, and the base of the tarsi, more or less, are honey-yellow; the tibial spurs are white, while the middle and hind tibiæ have a broad white annulus at base; rest of the legs mostly black. Wings hyaline, faintly dusky towards apex, the stigma and veins brown-black.

Type.—No. 8121, U. S. N. M.

Manila. (Father Brown.)

Subfamily XV.—Braconinæ.

Tribe III.—Euurobraconini.

Brownius, new genus.

This interesting new genus is named in honour of Father Robert E. Brown, S. J., to whom I am indebted for several sendings of Philippine Hymenoptera, among which were many new species in families and genera not before known to occur in the Archipelago.

Probably most Hymenopterists would have described this Braconid in Brullé's genus *Spinaria*, as I find some of the described *Spinariæ* really belong to *Brownius*. This new genus, however, falls into my tribe *Euurobraconini*, while *Spinaria*, Brullé, as I shall restrict it, will fall into the tribe *Braconini*.

Brownius has the venation much as in the genus *Bracon*, except that the submedian cell is *much longer* than the median; the recurrent nervure is received by the first cubital cell very near its apex; the second cubital cell is longer than wide, but shorter than the first or the third; the head is obtrapezoidal with the occiput and temples immargined; the prothorax is bidentate anteriorly and armed above with a long acute, erect spine on

its disk posteriorly ; the upper hind angles of the metathorax are obtusely toothed ; the abdomen is coarsely, somewhat longitudinally, rugulose and has five distinct segments, the fifth segment being triangular and terminating in a sharp median tooth, the dorsal segments three and four, with the lateral hind angles produced into a sharp tooth, while the fourth has also a shorter tooth on the middle of its hind margin.

Brownius armatus, new species.— ♀. Length, 9 mm.; ovipositor very short, hardly projecting beyond the tip of the abdomen. Pale brownish-yellow, the eyes brown, the antennæ, the hind legs, the dorsum of dorsal abdominal segments 1, 2, 3 and 4, and the wings, except a yellow band at base, black ; rest of abdomen pale or whitish.

Type.—No. 8123.

Manila. (Father Brown.)

Spinaria curvispina, Cameron, described from Borneo, and *Spinaria leucomaelaena*, Westwood, described from Siam, judging from the descriptions, probably fall into this genus. The true *Spinariæ* have the median and submedian cells of an *equal length*.

Subfamily XVI.—Rhogadinæ.

Tribe V.—Hecabolini. Hecabolus, Curtis.

Hecabolus rubrocinctus, new species.— ♂. Length, 0.8 mm. Black and shining, with the second abdominal segment reddish-yellow, the antennæ and the legs ivory-white, the eyes brown, the wings hyaline, the stigma and veins pale yellowish, the stigma of the hind wings large and brown-black.

Type.—No. 8131, U. S. N. M.

Manila. (Father Brown.)

Hecabolus ruficeps, new species.— ♀. Length, 2.5 mm.; ovipositor about the length of the body. Head reddish yellow, with brown eyes, the antennæ, except the first two joints, the thorax, and most of the abdomen, except as hereafter noted, black ; the legs and the apical margins of dorsal segments 3, 4 and 5, and all of the 6th and 7th segments, are honey-yellow. Wings hyaline, the stigma and veins brown-black, the tegulæ yellowish. The antennæ are very long and slender, much longer than the whole insect; the quadrate head is smooth and shining, impunctate ; the thorax is long, feebly shagreened, opaque, except the metathorax, which is shining and finely, sparsely punctate, with a distinct median carina at its basal half; the abdomen is elongate fusiform, the first, second and third segments, and the following more or less basally, are opaquely shagreened, the first being finely rugulose.

Type.—No. 8122, U. S. N. M.

Manila. (Father Brown.)

NEW TORTRICIDS.

BY W. D. KEARFOTT, MONTCLAIR, N. J.

The only apology for publishing the following descriptions at this time, is that the names have been made use of in identifying specimens for Messrs. Saunders, Winn and Young, and that "MSS" species are the *bête noire* of entomology—effectually locking up a species indefinitely, and prohibiting any one from referring to it in any way, no matter how common it may be or how interesting a life-history someone else may have worked out.

Tortrix semipurpurana, var. nov.—Head, palpi, thorax, antennæ and front wings pale lemon-yellow. A large purplish-brown spot rests on the dorsal margin and covers all of the wing, except a narrow line along costa, a small basal patch and a submarginal and apical band of yellow, these are all confluent, forming a wide inverted **U**, transversely through the dark blotch are two shining steel-gray fasciæ, which are continued through the yellow costal margin, as shining *yellow* scales. In the yellow space before the apex is also a short fascia of shining yellow scales, touching the costa. Cilia pale yellow.

Hind wing: Light purplish-fuscous, pale yellow at apex. Under side: front wing, yellowish-white, with upper dark blotch repeated by a shade of pale purple. Under side: hind wing, same as upper side.

Abdomen and legs very pale yellow, with a fuscous spot on upper side of segments 10 and 11.

Five ♂, twelve ♀. Bred, Montclair, N. J., oak, VI., 9; Cincinnati, Ohio, VI., 4 to 15, Miss Annette F. Braun; New Brighton, Pa., VI., 16 to 24, Frank A. Merrick; Chicago, Ill., June, Jos. H. Reading; Quincy, Ill., June, O. C. Poling; Toronto, Ont., June, H. S. Saunders.

The male specimens are of a paler purple than the female; in some examples of both sexes the purple area nearly or quite touches the costa at inner and outer third, thus enclosing a small middle costal yellow spot.

This dark form has been included in my collection with *albicomana*, Clem., and while I have not had sufficient experience in breeding to justify entire separation, the constant difference certainly warrants a varietal name.

Co-types, U. S. Nat. Mus., No. 8211, and my collection.

Eulia pinatubana, sp. nov.—Head, palpi, thorax above and upper side of fore wings, yellowish-red. Thoracic tuft, basal patch, oblique and

apical bands dark rust-red. The space between the basal patch and central oblique band is narrow, scarcely lighter than the basal patch, and indicated by a lighter edging on each side of the space which begins at the basal third of the costa and extends obliquely across the wing to the middle of the hinder margin. The space beyond the central band is similar to the last, beginning near the outer third of the costa and extending obliquely across the wing to the anal angle. The outer margin in some specimens is of the same colour as the interspaces, and the costa is more or less flecked with light yellow. Fringe yellowish, with grayish scales at the anal angle. Hind wing and abdomen above, silky gray or slate colour; under side and fringes lighter. Under side of fore wing light fuscous, lighter yellowish diffused spots along the costa and outer border. Under side of abdomen and thorax light straw yellow, as are also the legs. Fore and middle legs annulated with brown. Expanse 13. to 14. mm.

The above description is copied from p. 793, Fifth Report of the U. S. Entomological Commission, 1890, and applies to the Tortricid, the larvæ of which live on white pine, binding eight to twelve "needles" together and living in the tube thus formed. Specimens of the moth had been indentified by Zeller as the European *politana*, Haw., and our species has rested under this name ever since. I have lately secured a good series of *politana* from Europe, and after a critical comparison have no hesitation in separating, especially as the European species does not live in pine, but very dissimilar plants. A very complete life-history of our American species in given is the report referred to above; I have also bred it from larvæ with identical habits in Essex County, N. J., other specimens, of which I have about forty, Winchenden, Mass., V. 26 to VI. 3, Frank A, Merrick; Watchung Mts., N. J., IV. 29 to V. 8; and Toronto, Ont., V. 21, Henry S. Saunders.

Co-types, U. S. Nat. Mus., No. 8212, and my collection.

Phalonia Winniana, sp. nov.—Palpi, basal and second joint ochreous brown, long scales of latter white on outer half, and almost hiding third joint, which is very short and pale brown; palpi curved upwards, tip nearly at level of top of head. Head and collar creamy-white. Eyes large, round, black. Antennæ one-third length front wing, shortly ciliated beneath; fuscous, slightly paler between joints.

Thorax fuscous. Front wing: A broad transverse ochreous-white band in outer third, followed by a narrower fuscous subapical band, inner two-thirds fuscous and gray-brown. Basal patch not defined, the brownish-fuscous colour covering inner two-thirds, interrupted on dorsal margin by a geminate creamy-white spot, and the costa marked by paler and darker spots. The outer edge of dark area is nearly vertical, it is sharply indented at middle. The white outer band is narrowest on costa, broadening out a quarter below, and involving anal angle and usual position of ocellic spot, which is obsolete. It is white on costa, becoming ochreous towards outer and dorsal margins. Two small fuscous dots mark costa within this white area and two black dots on median line at end of cell. From costa, beyond white fascia, is an olivaceous band, darkest on edges, curving evenly before apex and terminating in a point just above anal angle on outer margin. This is bounded outwardly by a narrow whitish line, beyond a darker—blackish—line, broadest on costa. The apex and apical cilia fuscous, cilia below apex gradually becoming creamy-ochreous. Hind wings whitish in ♂, dark fuscous in ♀, cilia and under side the same, but a shade darker. Under side front wing: smoky fuscous, mottled with darker and with five creamy-white costal spots on outer half. Abdomen: grayish fuscous, anal tuft ochreous, legs creamy white.

One ♂, expanse 10.5 mm., Essex Co. Park, N. J., V., 20. Two ♀, expanse 12.5. mm., Montclair, N. J., VII., 18 (Light-trap), and Orford, Quebec, VI., 8 (Albert F. Winn). Co-type, U. S. Nat. Mus., No. 8213, and my collection.

I have had two of these specimens in my collection for several years, labelled *dubitana*, Hbn., but the recent accession of several European specimens of the latter showed conclusive differences; *dubitana* is creamy-white over the entire surface of fore wing, except a fuscous-brown middle oblique dorsal patch, a smaller costal spot above it, a narrow apical and outer margin line and a small basal patch. I have yet to see an American insect that compares with *dubitana*, and have no doubt that this name, with the majority of other European names in our list, will be dropped when the whole family is better known.

I take pleasure in dedicating this species to Mr. Albert F. Winn, of Westmount, Quebec.

NOTES ON HYDROMETRA MARTINI, KIRK. (=LINEATA, SAY).

BY J. R. DE LA TORRE BUENO, NEW YORK.

Genus HYDROMETRA, Latreille et auctt. (=Limnobates, Burmeister et auctt.) H. Martini, Kirkaldy, 1900 (=lineata, Say, 1832.)

The peculiar facility of the older entomologists, the fathers of the Science, for discarding each other's generic and specific names has in this instance, as in many others, given rise to a complicated synonymy, of which I give above that covering this extremely interesting little water-strider. It is given more in detail in The Entomologist (London, Eng.) for June, 1900, on page 176, in which Kirkaldy elucidates it, relegating Say's specific name to synonymy, as it unfortunately has been preoccupied by Eschscholtz, who in 1822 described *Hydrometra lineata* from Manila, Philippine Islands. In the paper mentioned hereafter, Mr. J. O. Martin discusses the generic synonymy.

In March, 1900, pp. 70–76, THE CANADIAN ENTOMOLOGIST published "A Study of Hydrometra lineata," by the last named author, a most interesting paper on the habits and peculiarities of this Hemipteron. The notes I now present are largely supplementary and confirmatory of his work, although I may say that my labours were not directed to that end. In May of 1903, Mr. W. T. Davis took me to Staten Island, where, in a marshy pond, we found *Hydrometra Martini* by the hundred. We took them until we got tired. Again in May of this year, we took very many more at the same place. Subsequently, I have found them here and there, in ones and twos, or in greater numbers, without any effort, which bears out Mr. Martin's experience, although I have nowhere found them as abundant as at Staten Island. This little bug prefers to hug the shore, hiding among the grass-stems growing out of the water. One's shadow falling on it seems to disturb them, and they emerge from their hiding places, and these seemingly tiny twigs can be seen moving briskly away, borne on their hair-like legs, with which they *run* on the surface, or else they remain motionless, letting some friendly little breeze waft them away. It is to be noticed that *Hydrometra walks* on the surface of the water and does not propel itself by a rowing motion, as do the *Gerridae* and other Water-striders. Its tarsi also are provided with claws terminal and not set above the tip of the last tarsal joint as in the latter family. The winged form of *Hydrometra Martini* must be very rare in the north, as out of about two or three hundred individuals I have seen, I have found only two fully winged males.

January, 1905.

Hydrometra has a very curious habit that I have frequently noticed. It lowers its body by bending the legs, until it touches the surface, and there it lies, as it were, taking its ease. I have also noticed aquarium specimens putting out their hair-like rostra and penetrating the surface film with them. It feeds on the insects that fall into the water and attacks them even before they cease to struggle. In the latter case it is extremely interesting to watch them stealthily approach their victim, extending and retracting their long beaks, retreating hastily at some sudden struggle of their prey, then once more resuming their cautious, slow approach, until at length, when the struggles of their destined meal grow feeble, some bold one injects into it the deadly poison of the Hemiptera, stilling its motions, and the others then hasten to the feast. As noted by Martin, several will fasten their beaks into one insect simultaneously.

Although Martin casts much light on it, especially on the oviposition and kindred phenomena, the life-history of *Hydrometra Martini* is still but imperfectly known. To his data my observations this summer enable me to add one or two facts of interest. I have not witnessed oviposition so entertainingly described by this author. The ovum, however, I have seen, and it is a most beautiful object under the microscope, answering in every particular to the most excellent drawing of it in his paper. I was, however, able to ascertain the period between mating and oviposition. A bred virgin female was mated on July 26th with one of the wild males taken in Staten Island in May of this year. It immediately began to swell and on the 28th or 29th of that month the first ovum was deposited, the female being then quite swollen with ova, and continuing oviposition thereafter. The number of ova deposited by a single female in the course of a summer, under favourable circumstances, must be large. The two I kept alive of those taken in Staten Island oviposited continuously from the beginning of May to the end of August, and although I did not count them, the sides of the aquarium were thickly studded with the ova, and they must have numbered hundreds. This is the more remarkable, when we consider that the abdomen of a full-grown female is not much over 6 mm. long and the ova are between 2½ and 3 mm. The period of emergence varies with the temperature. In the cool days of spring it is as long as 19 days; in midsummer I have had ova hatch in about nine to ten days. The nymphal stages are five, and the time between moults is about three days, giving about fifteen days for the nymphal instars. This

I observed in a number of specimens I succeeded in raising from the ovum, some carried through to maturity, others living only through a few instars. The life-cycle can therefore be completed in from 25 to 35 days. This would give from three to five broods in the course of the summer, which must be the case, as young and old adults and nymphs in several stages can be found together at almost any time during the warm weather. The nymphs in a general way resemble the adults, except that they are a light green, save where the stomach contents show through the transparent integument. They have a way of carrying the abdomen turned up somewhat as do certain Staphylinds among the Coleoptera. When fresh after reaching maturity, they are covered with a grayish pruinosity. This frail little bug is long-lived too. Under favourable circumstances they live at least a year. The individuals I observed were of last year's broods and they survived in my aquaria until late in August, when they died of old age, the last one being a male, which gave up the ghost on the last day of the month.

Mr. Martin to the contrary notwithstanding, I have found no difficulty in breeding *Hydrometra Martini* in my aquaria. I kept the mated adults in a large aquarium and by preserving the inner surface of the glass above the water clean and polished, they were prevented from getting a foothold to aid them in climbing out and escaping. Their ova were deposited on the sides of the aquarium, and the young emerged without any mishap. For their comfort, a few pieces of duckweed afforded them a resting place, although they seemed to prefer to cling to the sides of the aquarium or to climb up a little way from the surface of the water, holding on to the roughness caused by the coating or sediment left on the glass by the water as it evaporated and became lower in the vessel, or where it had splashed in moving the aquarium about. They are sufficiently hardy to have survived two trips of a couple of hours each, confined in a collecting bottle tightly closed. For food, flies were the staple, with an occasional mosquito or other soft-bodied insect by way of change. I think that with ordinary care a very complete life-history could be worked out in an aquarium. The only species of *Hydrometra* recorded from the United States is *Hydrometra Martini*, Kirk. Close collecting may eventually show others, especially along our southern border, in Texas, Arizona, etc. In fact, Say in his original description of *Hydrometra lineata* notes a form that he calls "var. *australis*," from Louisiana. It has been my good fortune to receive from Georgia, near the Florida line, one specimen

answering to his description. The genital characters are such, however, that I think it may be considered a new species, for which I propose the name *Hydrometra australis*. The figures attached (Figs. 3 and 4) show the differences in the genitalia, drawn from my specimen (a male), for *australis*, and redrawn from Martin's figures for *Martini*.

In addition to the characters drawn from the *genitalia*, it differs from the typical *Martini* in the antennal and head characters pointed out by Say, which appear to me sufficiently definite for separation. Lack of material has prevented me from making the detailed study necessary to indicate them minutely, but careful examination of my single specimen leaves no doubt as to their presence.

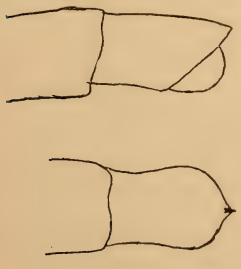


Fig. 3.—Hydrometra Australis. Male genitalia from side and above. (Original.)



Fig. 4.—Hydrometra Martini, Kirk. Male genitalia from side and above. (After Martin.)

A NEW GELECHID FROM ONTARIO.

BY W. D. KEARFOTT, MONTCLAIR, N. J.

Aristotelia Youngella, sp. nov.—Head, antennæ, palpi, thorax, abdomen and legs shining iridescent green. Basal half of front wing and outer half along costa black or very dark brown, heavily overlaid with iridescent green. The dark basal half is outwardly margined by the black ground colour, owing to absence of the iridescent scales at this point. All the outer half of wing, except the dark costal streak, is dull ochreous, inwardly margined by a pale yellow line, the latter adjoining the dark line of ground colour outlining the basal half. The ochreous and yellow touch the costa at the middle only, and the ochreous shade encloses the dark costal patch, the latter divides the apex and is one half the width of the wing except at its inner end where it is rounded

off into the costa. A tiny dark-brown or black dot on ochreous just at end of cell, and below, but not touching the dark patch above it. The division line in middle of wing, dividing dark basal half from ochreous outer half, is slightly oblique. Cilia fuscous. Hind wing and cilia fuscous, latter once and a half to twice the width of hind wing. Under side front wing fuscous, thinly overlaid with iridescent green, hind wing same, but green only along costal half. Expanse, ♂ 10. to 10.5 mm., ♀ 12. to 12.5 mm.

Nine specimens, ♂ and ♀, Hurdman's Bridge, near Ottawa, Ont., VII., 7 and 9. Co-types, U. S. Nat. Mus., No. 8214, collection of Mr. Young, and my collection. Collected by Mr. C. H. Young, whose name I am particularly pleased to associate with this very beautiful and dainty species, as strictly representative of his own exquisite work in the Micro-Lepidoptera.

A NEW SPECIES OF NORTH AMERICAN PROTEOTERAS.

BY PROF. C. H. FERNALD, AMHERST, MASS.

Proteoteras Moffatiana, n. sp.—Expanse of wings, 14–20 mm. Head, thorax and fore wings emerald green, varying considerably in the different specimens, some being much brighter than others. The fore wings are marked with black, and many parts have silvery reflections in certain lights. On the basal fourth of the costa there is a small quadrate black spot, below which the basal part of the wing is more or less marked with streaks or irrorations of black. On the middle of the costa is a black quadrate spot connected below with a black stripe extending from the cell outwardly, but not reaching a subapical black spot, which sends a prolongation down along the outer border. There is a series of geminate light spots on the costa, two at the base, two between the quadrate costal spots, and five on the outer half of the costa. The extreme apex is black.

Hind wings and abdomen above fuscous; under side of all the wings fuscous. The costal edge of the hind wings of the males beneath marked with black.

Described from four males and three females. Habitat, London, Ont. (Moffat); Lancaster, N. Y., Oct. 22, 1880; Milford, N. H., June 28, 1870 (Whitney).

I take pleasure in naming this interesting and variable species after the late J. Alston Moffat, who for many years was the able and industrious curator of the Entomological Society of London, Ontario.

January, 1905.

PRELIMINARY LIST OF THE MACRO-LEPIDOPTERA OF ALBERTA, N.-W. T.

BY F. H. WOLLEY DOD, MILLARVILLE, ALTA., N.-W. T.

(Continued from Vol. XXXVI., p. 355.)

150. *Hadena (Xylophasia) remissa*, Hbn.—Nine ♂ ♂ at light in 1903, and a few of both sexes at light and treacle during 1904. Not previously met with. July 15th to Aug. 2nd. Prof. Smith says they are "somewhat paler in ground colour than New England examples." In a general way the species resembles a pale *ferens*, with which species Mr. Hudson and I at first confused it whilst collecting.

151. *H. (X.) suffusca*, Morr.—Fairly common at treacle. End June and July.

152. *H. (X.) rorulenta*, Smith.—(Psyche, June, 1904, p. 55). Described partly from Calgary material. Allied to and contemporaneous with *suffusca*, but less common. I had the forms standing in two series in my collection for some years, and there always seemed to be a sharp contrast between them, nothing intermediate ever turning up. Prof. Smith does not state whether he compared the type of *suffusca* when naming this species, but says: "I have separated out as *suffusca* those examples in which the ground colour is of an even lilac-gray, the reddish suffusion is uniform, and neither the ordinary spots nor the terminal space contrast strongly. In the new species either the reniform or terminal space, or both, contrast strongly, and are violet or lilac gray. The s. t. line is more sharply defined, the preceding marks blackish and more contrasting, as well as more numerous. The lower half of the wing tends to a gray, which is best marked on the inner margin. The upper half of the wing is reddish, pulverulent, and is darkest on the costa." I would add that the ground colour of the newly-named form is of a reddish ochreous, much like the pale ground of *vultuosa*, and that the reddish shading in upper half of wing contrasts strongly, and is much more conspicuous than it is against the dark lilac-gray ground of *suffusca*. Prof. Smith has specimens also from Winnipeg, Denver, Colo., and New York State, so the two species, if such they really are, would seem to have much the same range, and are probably mixed in many collections. The type is at Rutgers College, and a perfect pair of co-types are in my own collection.

153. *H. (X.) vultuosa*, Grt.—Rather rare. End June and July.

154. *H. (X.) contradicta*, Smith.—Generally very rare. Described

from Calgary. The type, which is in the National collection at Washington, was taken at treacle near the mouth of Fish Creek on June 22nd, 1893. It has turned up amongst Pine Creek hills in 1896, 1899 (one only) and 1904. End June to middle July, and all, I think, at treacle. I have not yet heard of its occurrence in any other locality. A handsome species, and not easily mistaken. A figure is given with the description.

155. *H. (X.) morna*, Streck.—A single ♂, June 19th, 1897. The species looks to me rather like a pale variety of *passer*, in which species the ground colour is almost uniform olive brown. In my *morna*, which Prof. Smith refers to *Hulstii*, this is replaced, except in costal region and terminal area, by ochreous.

156. *H.(X.) cerivana*, Smith.—Seldom common. June and early July; at treacle. Described from Calgary. The type is at Washington. Dr. Dyar treats this as a variety of European *basilinea*, Fabr., but Prof. Smith has examined a good series of both forms, as well as of *finitima*, Gr., and whilst believing them all three to be distinst, claims that *cerivana* is nearer to *finitima* than either is to *basilinea* (Can. Ent., XXXV., 134, May, 1903). My only *finitima* is a ♀ from N. Y., and differs widely from the Calgary species, both in colour and in the entire absence of grayish suffusion. A figure is given with the description.

157. *H. (X.) lateritia*, Hbn.—Has been a bad treacle pest in some years. June and July.

158. *H. (X.) dubitans*, Walk.—Rare on the whole. July. By some peculiar error which I have never satisfactorily explained, I had for some years *H. Alberta* standing under this name, or rather under *sputatrix*. This mistake was certainly not Prof. Smith's, and the species are quite dissimilar. Meanwhile my *dubitans* did duty for *Helotropha reniformis*, a species of which I have no Alberta record. I probably often used to send out *dubitans* and *Alberta* under such erroneous names, but was never corrected!

159. *H. (X.) impulsa*, Gn.—Very rare. July. A black species, which at first sight might be mistaken for *Mamestra assimilis* without the white spot near anal angle.

160. *H. (X.) devastatrix*, Brace.—One of the commonest Noctuidæ, and a bad pest at treacle. Met with commonly under bark on dead trees, etc., and in outbuildings. End June to August. Have a fair specimen dated Sept. 8th. I know of no species which has so often "fooled" me on the treacled posts, by looking like something new, and what is more, I

don't seem to be used to it yet! It certainly shows considerable variation, but I fancy the deception is generally due to the varying effects caused by the different angles at which the lantern rays shine on it.

161. *H. (X.) arctica*, Bdv.—This decidedly pretty, and I suppose well-known species, was fairly common at treacle in 1896, and I had taken a few specimens previously. I don't think either Mr. Hudson or myself have met with it since. End June and July.

162. *H. (X.) occidens*, Grt.—Very rare. End June and July.

163. *H. (X.) versuta*, Smith.—Described from Calgary. The type is in U. S. Nat. Museum. Generally common at treacle in the hills. June and July. The variation, though by no means striking, is considerable, and apt to be rather confusing, both when collecting and in the series. I do not think, however, that I have more than one species under the name. There is often a mossy or bronze lustre, but this is sometimes lacking, and the forms are then dark powdery gray. It may be almost unicolorous, and the markings, never very distinct, obscured, or the reniform may stand out rather conspicuously in whitish. The s. t. area is sometimes rather conspicuously paler than rest of wing, especially near the inner margin. It is really the variation in lustre and the suffused nature of the markings which render the study of a long series necessary before the species can be recognized at sight with any degree of certainty. Nearly ninety per cent. of my specimens are ♀ ♀. Figure is given with description.

164. *H. (X.) ferens*, Smith.—(Can. Ent., XXXV., 134, May, 1903). Described from Calgary. The type is a ♂ in the Rutgers College collection. Very rare until 1903 and 1904, when over twenty specimens turned up at light. Prof. Smith states that it is near *runata*, a species I have not yet seen. It is certainly very like *allecto*, from which, however, it may be distinguished easily by the absence of grayish powdering, and greater length, comparative to width, of wing. Bad specimens, too, are not unlike *remissa*, which species has, however, larger, rounder and paler discoidal spots. Sir George Hampson says: "I doubt its being distinct from *separans*, Grt." He has charge of the type of that species, and doubtless has good grounds for the suggestion. July.

165. *H. (X.) enigra*, Smith.—(Psyche, June, 1904, p. 54). Described from Calgary. Seven ♂ ♂, July 3rd to 19th, at light, 1903. Prof. Smith says after the description: "This is one of those obscure species that have no positive characters, and depend for their standing upon the absence of

any that distinguish others. It is a little like *fumosa*, but has entire secondaries. The absence of black in the basal space excludes it from *ferens*, which it otherwise resembles in size and general habitus." I hardly dare add anything, as, though I suggested a different species to Prof. Smith, I had it mixed with *ferens*, small and badly marked specimens of which, especially if a bit rubbed, are hard to distinguish from it. It seems to bear the same relationship to *ferens* that *Mamestra negussa* does to *M. gussata*; *i. e.*, the later species lacks the numerous black markings which characterize the older. Prof. Smith has the type, and I have a co-type.

166. *H. (X.) cinefacta*, Grt.—Rare in Pine Creek at treacle during July. I found it fairly common flying over flowers of *Symphoricarpus occidentalis* or the western snowberry, on the Red Deer River flat north-east of Gleichen, both before and after sunset, in early July of last year (1904).

167. *H. (X.) unita*, Smith.—(Psyche, June, 1904, p. 54). Described from a single ♀ taken near Calgary on June 26th, 1897, probably at treacle. The species is now in the Rutgers College collection. Prof. Smith says: "It resembles and is allied to *cinefacta*, but differs in the uniform bluish ash-gray, the even black bar connecting the median lines, and in the clearer, better defined markings." It stood for five years in my collection labelled "? *cinefacta*" on Prof. Smith's authority, but the reference always was, and still is, a puzzle to me. Sir George Hampson and others have accepted the species I held as *cinefacta* without challenge, but I never saw a specimen with the least trace of the "uniform bluish ash-gray," which is so evident in this specimen.

168. *H. (X.) Alberta*, Smith.—(Journ. N. Y. Ent. Soc., XI., 8, March, 1903). Described from Calgary. The type is at Rutgers College. I have one ♂ and two ♀ co-types, and a ♂ co-type is in the British Museum. Seldom at all common. Middle June to middle July, at treacle. Prof. Smith says that it is "allied to *cinefacta*." It could not possibly be mistaken for that species as I know it. It is a dark leathery-brown insect, sometimes almost black, and the maculation is always obscure. As mentioned above, I had this species standing for some years as *sputatrix* by some inexplicable error. I certainly never for a moment confused the two.

169. *H. (X.) Barnesii*, Smith.—A single ♂, in good condition, found by Mr. Hudson under the bark on a poplar tree at Lineham's lower log

camp, in the foothills on Sheep Creek, on July 16th, 1898, has been so referred by Prof. Smith, and passed as such by Dr. Barnes. A perfect ♀ taken at light at the C. P. R. chalet at Lake Louise, Laggan, on July 14th last, I have placed under the same name, though I admit it is almost as much like the following species.

170. *H. (X.) sora*, Smith.—(Can. Ent., XXXV., 133, May, 1903). Two fine ♂ ♂ only have been taken. One is the type which is now at Rutgers College, and the other a co-type in my own collection. July 2nd and 15th, 1896; treacle. In general appearance the form suggests ♂ *Barnesii*, but is shorter winged and more even in colour than my ♂ of that species. I had at first looked upon both as probable varieties of *Alberta*, but they are really more like *auranticolor*. Neither need be confused with that species, however, which is larger and much more strongly coloured.

171. *H. (X.) semilunata*, Grt.—Always rare. Treacle. June.

172. *H. allecto*, Smith.—Rather rare. At treacle, in September. Described partly from Calgary material. The type is in the U. S. National Museum. According to Prof. Smith, this species differs superficially from *mactata* only in colour, of which *allecto* lacks the reddish or brown shadings, and is black and gray only. I have examined a number of specimens from both Calgary and Cartwright, Man., but have been unable to procure true *mactata* for comparison. Some specimens seem to me to have a slight brownish tinge, especially a Cartwright ♂ sent me by Dr. Barnes labelled *mactata*. Mr. Heath, however, has not *mactata* on his list, and all the *allecto* he sent me were like the Calgary form.

173. *H. transfrons*, Neum.—Sometimes very common at light and treacle, but, in eleven seasons, I am not aware that amongst the numbers taken by Mr. Hudson and myself, more than two have been ♀ ♀. I used at one time to send it out as *violacea*, with which species I am not familiar. Dr. Ottolengui corrected the error. There is considerable variation in intensity of colour. In some specimens the s. t. area is conspicuously white, in others scarcely contrasting. Sometimes the violaceous colouring of central band, and even basal area, is intensely rich, and such specimens are very pretty. July and August. The type is recorded vaguely from "British Columbia," and is in the Museum of the Brooklyn Institute of Arts and Sciences.

174. *H. claudens*, Walk. Nearly always a rarity, but some numbers turned up at treacle in 1903, a year favourable to many *Hadenas*. Middle August to middle September.

175. *Polia pulverulenta*, Smith.—Rather rare as a rule, but fairly common in 1903. August to middle September.

176. *P. medialis*, Grt.—A ♂ taken at treacle near mouth of Fish Creek, on Sept. 30th, 1894, was named *medialis* by Prof. Smith. Another at treacle in the hills on Sept. 4th, 1896, passed as that species with Dr Barnes. Neither are in my collection. Two ♂ ♂, also at treacle, in the hills on Pine Creek, Sept. 14th and 15th, 1903, were erroneously recorded by me, from memory of the former specimens, as *medialis* in Rep. Ent. Soc. Ont., No. 19, p. 92. Prof. Smith afterwards saw one of the latter specimens, and said concerning it: "Not *medialis*, and nothing like it in my collection." I have a specimen from Cartwright, Man., sent me as *confragosa*, which I believe to be conspecific with these latter. The two older specimens may or may not have been correctly named.

177. *Hyppa xylinoides*, Gn.—Fairly common at treacle some seasons. Middle June to middle July.

178. *H. brunneicrista*, Smith.—Described from Calgary, and I have not yet heard of it from any other locality. The type is at Rutgers College. Apparently very rare, but its seeming scarcity may be due to its having been overlooked. It flies at the same time as *xylinoides*, with which I for a long time confused it. Its validity is, however, beyond question. It differs from the preceding species mainly in these respects: (1) The pectinations of ♂ antenna are longer, giving them a much heavier appearance. This is quite obvious to the naked eye. (2) The thoracic tuft is rusty-brown tipped. (3) There is a rusty shading in s. t. area near anal angle, and the s. t. line is *not* sharply angulated at that point, where it also lacks the black crescent-shaped mark before it. It is, in fact, in the anal angle where the most obvious points of difference may be looked for in ♀ ♀. (4) The secondaries are more even and duller smoky, and though the species is darker as a whole, this point is not a constant feature. Four or five specimens were taken at treacle during the past season (1904), which are all I have seen for about six years, during which time its congener, with which it flies, has not been at all common. I have a ♀ co-type.

179. *Euplexia lucipara*, Linn.—Decidedly rare as a rule, but more common than usual in 1904. June, at treacle.

180. *Homohadena stabilis*, Smith.—Described from Calgary. Type at Washington. Common some years in July and August. Have bred it

from larvæ feeding on the Western Snowberry *(Symphoricarpus occidentalis)*. A dull red-brown species, with sometimes no sign of maculation whatsoever, except very faint traces of t. a. and t. p. lines. A figure is given with the description.

181. *H. badistriga*, Grt.—Very rare. July and early August; treacle. I have only one ♂ and two ♀ ♀, no two alike in either colour or markings. Dr. Fletcher says his specimens of *badistriga* have white secondaries. In my three they are smoky, and the name may be wrong. *H. fifa*, Dyar (CAN. ENT., XXXVI., 30, Feb., 1904), is a closely described form, to which one of my ♀ ♀ might possibly be referable. I have Manitoba specimens of both sexes similar to this ♀, which were sent me as "either *badistriga* or *kappa*." The latter species is unknown to me. I am inclined to think that my three specimens are not all the same species.

182. *Oncocnemis pudorata*, Smith.—Occurs in the mountains at Laggan (Bean). The type is from Agnes Lake, near there, at about 6,700 feet, and is at Washington. I have a fine ♂ specimen from Mr. Bean, which I am pretty sure is this species. A figure is given with the description.

183. *O. atrifasciata*, Morr.—Two specimens only, both ♀ ♀, and quite fresh. One on a fence rail in daytime, July 10th, 1896. The other at treacle, Aug. 18th, 1903.

184. *O. viriditincta*, Smith.—A single ♂ at treacle, near mouth of Fish Creek (Bow valley, below Calgary, and east of the hills), on Aug. 27th, 1894. The specimen has one hind wing chipped, but is otherwise good. The type, which is in the Rutgers College collection, is from "McLean, B. C.," and was taken by Mr. Bean. McLean, as before stated, is in Eastern Assiniboia, where Mr. Bean formerly resided. Mr. Heath records the species from Cartwright, Man., so it would seem to be a prairie rather than a mountain species in the west. It has apparently been taken in eastern Canada. A figure is given with the description.

185. *O. Chandleri*, Grt.—Used to be very common, but I have not taken it for some years. I think Prof. Smith redescribed it as *confluens* about 10 years ago, but the description was never published. Under that name I formerly distributed it. July to middle September. Treacle and light. One year it was a pest at both.

186. *O. cibalis*, Grt.—Rarely common, and not seen for years. Middle July to middle September.

187. *Rhynchagrotis gilvipennis*, Grt.

188. *R. rufipectus*, Morr.—Both pretty common. July and August.

189. *R. anchocelioides*, Gn.—I have a ♀ so named by Prof. Smith, but which looks to me exactly like Dr. Holland's figure of *alternata*. The specimen bears no date.

190. *R. placida*, Grt.—Fairly common at treacle some seasons. July and August. I may have more than one species under the name.

191. *Adelphagrotis prasina*, Fabr.—Generally rare, but it came rather frequently to treacle in 1903. July and August.

192. *Platagrotis pressa*, Grt. Rare. July and August. Sir Geo. Hampson says: "I doubt this being *pressa*, it is much too uniformly gray and fuscous. We have a similar specimen from California."

193. *Euretagrotis inattenta*, Smith.—(Journ. N. Y. Ent. Soc., XI., 5, March, 1903). Described partly from Calgary material. The type, which is in the Rutgers College collection, is a Calgary specimen. Resembles *perattenta*, under which name I have sent it out. Compared with that species, Prof. Smith says in the discription: "The new species is uniformly larger, darker, and even in colour, without mottling, and with the terminal space not lighter than the ground, though in one case somewhat lighter than the s. t. spaces." I have not yet had an opportunity of comparing the two, though *perattenta* seems to occur at Cartwright.

194. *Pachnobia littoralis*, Pack.—Prof. Smith used to call my form *pectinata*, but more recently he has said: "Your *littoralis* seems to be the normal form of that species." I may have both forms, but do not know their characteristics. Common at light and treacle. June and July.

195. *P. salicarum*, Walk.—Common at sallow blossom and light. End April (earliest, 23rd) and May.

196. *Agrotis aurulenta*, Smith. One fine ♂ at light, July 28th, 1903.

197. *A. ypsilon*, Rott.—Not common. I have taken it in fine condition from June 23rd to Oct. 5th.

198. *Peridroma occulta*, Linn. Common. End June to August. Treacle. Very abundant during 1903, and a nuisance at treacle. I took the opportunity, however, of picking out a fine series of perfect specimens, including some very handsome forms. During the latter part of May and early June the larva was to be seen in some numbers on the ends of willow twigs in the daytime. These were apparently attacked by some parasitic fungus, as they died on the twigs, to which they remained clinging.

199. *P. astricta*, Morr.—Always common. End June to August. Treacle and light. Exceptionally common during 1903, but in fewer numbers than *occulta*.

200. *P. nigra*, Smith.—Not common. July and August. Treacle. I took a good series during 1903, when, though by no means common, it turned up in greater numbers than previously. The species has a bluish-black appearance, with sometimes a few paler shadings of ochreous or brownish ochreous, but very different from the brown of *astricta* or the gray of *occulta* It is hard to get in good condition. I had this standing for some years doubtfully as *X. castanea*, a species with which I am not acquainted.

201. *P. margaritosa*, Harr., var. *saucia*, Hbn.—Not common. I have no May or July records, but have taken it in fair condition from middle to end of June, and perfectly fresh specimens from Aug. 9th to Oct. 20th. I do not know the type from the variety, and may have both.

202. *Noctua Smithii*, Snellen.—Common. July and August. The erroneous reference to *baja*, Fabr., under which name this common North American species used to be known, is not given in Dr. Dyar's list.

203. *N. Normaniana*, Grt.—Not rare. July and August.

204. *N. juncta*, Grt.—Redescribed from Calgary by Prof. Smith as *patefacta*, the type of which is in the U. S. Nat. Museum (Ent. News, VI., 333, and pl., Dec., 1895). Rather rare. End July to early August. Treacle and light.

205. *N. substrigata*, Smith. Described from Calgary, and figured with the description. Common at light and treacle. Middle June to August. Type in the U. S. National collection at Washington.

206. *N. Treatii*, Grt.—In Can. Ent., XXXI., 200, it is stated that this species is "not uncommon at Calgary." This is a mistake. It has always been a decided rarity, and hard to get in perfect condition, until 1903, when it was decidedly common, and one of the most frequent and regular visitors to light for some weeks. Mr. Hudson and myself took a large number of most perfect specimens. Also taken at treacle. July and August.

207. *N. c-nigrum*, Linn.—I used to look upon this as a rarity here, but it has been more common during the past few seasons, though by no means abundant. Treacle. Less frequently at light. July and August.

208. *N. cynica*, Smith, var. *perumbrosa*, Dyar?—(Can. Ent., XXXVI., 31, Feb., 1904, and 102, April, id.). A ♀ dated Aug. 12th, 1903,

which seemed to me a unique, was stated by Prof. Smith to be "probably the species Dr. Dyar calls *umbrosa*." The name, being found preoccupied, was changed as above. Prof. Smith tells me he has a specimen from Cartwright, Man., and I have a ♀ from the same locality, which looks the same. Dr. Dyar's reference of *perumbrosa* to *cynica* rather than to *rubifera*, is based on the form of ♂ genitalia. My Calgary specimen is of a rather uniform dark brown, with scarcely any tinge of red or contrast in shades. The t. a. and t. p. lines seem less waved than in *rosaria*, which it resembles more nearly than anything else in my collection, and the secondaries are dark smoky. Described from Kaslo, B. C. The type is presumably at Washington.

209. *N. rosaria*, Grt.—Fairly common at treacle some seasons. Middle June to middle July.

210. *N. Calgary*, Smith.—Described from here. The type is at Rutgers College. Generally common, rather more so than the preceding, at treacle, during the same period. I used to confuse the two species, but careful study of long series enabled me at last to distinguish them at a glance. In form *Calgary* differs from *rosaria* in having less rounded apices; in maculation in having the terminal area not darker, but usually paler, than the subterminal. In *rosaria* the reverse is almost invariably the case. *Rosaria* is of a rosy red colour throughout, whereas the tints in *Calgary* are brownish red and brownish ochreous. In *rosaria* the basal t. a. and t. p. lines are almost always double, generally fairly distinct, rarely obsolete. In *Calgary*, though generally traceable, they are rarely distinct, and still more rarely are any of them double. The t. p. line may be followed by a narrow pale shade, but the outer portion of the line is usually obsolete, or at any rate is not distinguishable from the dark s. t. shade, as it is from the PALE s. t. shade in *rosaria*. The spaces in the cell between the spots and before the orbicular are sometimes black in *Calgary*, but never in *rosaria*. I have bred specimens from larvæ beaten from sallows in early spring. The ♀ ♀ of both species are smaller than the ♂ ♂.

211. N. *dislocata*, Smith.—(CAN. ENT., XXXVI., 149, June, 1904). Described from here from four ♂ ♂ and two ♀ ♀. The type is in Prof. Smith's collection, and a ♂ co-type is in my own. The description applies for the ♂, which I feel convinced is a good species, but I have no reason for believing that a ♀ co-type sent me by Prof. Smith, picked from his series of *Calgary*, is other than that species. It is by no means common,

but about a dozen specimens were taken at treacle during 1904, more than had been taken altogether previously. I have never seen any ♀ ♀ which I have suspected of being this species, which I first recognized three or four years ago. The description is an excellent one, but as no corresponding description of *Calgary* was ever published, will not serve to distinguish it from that species. And the broken median shade upon which the name is based, though probably characteristic of the species as a whole, cannot be relied upon even in the ♂ ♂ for the separation of individual specimens. I have closely examined 64 ♂ ♂ and 15 ♀ ♀ of *Calgary*, and "bluish ash-gray," which fits many of the present species well enough, will not apply to any of the older forms. A few of my *dislocata*, however, are of that brownish-red tint common in *Calgary*, but none have the ochreous shade generally present there as well. *Dislocata* averages a little larger, and as a rule has the transverse lines, including the terminal line on both wings, a little heavier and more clearly defined. The paler markings in the reniform, when they exist, seem to be of a faint yellowish tinge rather than whitish, as in *Calgary*. The orbicular is usually but not constantly larger and rounder. The central shade, as mentioned above, seems generally, not always, distinctly broken; and in at least four of my most obvious ♂ *Calgary*, the break is very pronounced indeed, but it is much more often uninterrupted. The same break is occasionally seen in *rosaria*. The collar in *Calgary* is generally a little paler than the rest of the thorax, but in the present species is more often about unicolorous. I may be over-confident, and yet I never felt more sure of a species which I was so incapable of defining. It may be claimed that the inability unjustifies me in condemning the ♀. I cannot always recognize the species at a glance, and I have at least two ♂ ♂ which I am unable to place with certainty. It flies at the same time as *Calgary*.

212. *N. oblata*, Morr.—Common in some years. Middle June and July. Treacle. Have bred it from larva beaten from Salix in early spring.

213. *N. fennica*, Tausch.—Have seen it not uncommon at treacle, but it has been rare of recent years. End June to August.

214. *N. plecta*, Linn. Very rare, and I have never taken a perfect specimen. July, at light.

215. *N. collaris*, G. & R.—Rather common at treacle. August.

216. *N. inopinatus*, Smith.—Not very common as a rule, though it appeared in some numbers at light and treacle. July and August.

Described from material from Manitoba, Vancouver Island and Colorado. The type, figured in CAN. ENT., XXXII., No. 8, Pl. 5, is from Brandon, Man., and is in the U. S. National collection at Washington. Said to be intermediate between eastern *haruspica* and western *sierræ*. In his description Prof. Smith says: "In size the new species averages less than *haruspica*, and the colour is, as a whole, more even smoky, with less red. The ordinary spots are somewhat better relieved, while the median lines tend to become broken and incomplete, while yet the detached parts may be well marked." I have one ♀ sent me from the States as *haruspica* without data, and four fine specimens from Mr. C. H. Young, of Hurdman's Bridge, Ont., which Dr. Fletcher tells me are typical eastern *haruspica*. The U. S. specimen differs from the Calgary form in accordance with Prof. Smith's remarks, except that some of my *inopinatus* are much redder, and whilst a series of forty specimens from Calgary and Cartwright, Man., collectively differs from the four Ottawa specimens in like manner, if the two series were mixed, I certainly could not distinguish them without the labels. In his notes to me recently Prof. Smith said: "It is quite possible that we have to do with races instead of final species." To my mind the extremes in my two series overlap in the different characters in such a way as to obviate any suggestion of two species. I sent one of my reddest specimens to Sir Geo. Hampson, who said: "I should call it *sierræ*." He recognizes both species, however, and has both from Colorado in the British Museum. *Sierræ*, which I have never seen, was described from California, where, Prof. Smith tells me, *inopinatus* is probably not found.

217. *N. clemens*, Smith.—Four specimens. One June 20th, 1901; the other three at light, on May 31st, 1902. Prof. Smith says that Colorado specimens are a little larger. The species bears some resemblance to *Chorizagrotis balanitis*, in mistake for which Mr. Hudson thinks he may have passed it over.

218. *N. clandestina*, Harris.—Generally the commonest noctuid, often extremely abundant. A great frequenter of buildings, particularly if built of logs. On some nights during hot seasons they are a bad pest in houses. I used to think they were attracted thither entirely by lamps, but though they certainly swarm round a light, their presence in the rooms seems to be to some extent accidental. I have seen them in hundreds in a room before the lamps have been lighted, where the night before there were few or none to be seen. They appear to creep into cracks and crannies from the outside to pass the daytime, and a large number of them come out at dusk on the inside. Fortunately, they do not, as a rule, come very freely to treacle. I have bred very few from "cutworm" larvæ. End June to August. (To be continued.)

FURTHER NOTES ON TYPES AND OTHER SPECIMENS IN THE BRITISH MUSEUM. *

BY HENRY H. LYMAN, MONTREAL.

Having planned a trip to Europe for the early part of last spring, I was anxious to utilize the opportunity to compare some specimens with types in the British Museum, but as I was sailing to the Mediterranean and going to spend most of my time in Italy, it was impossible to take more than a very few specimens, as I had to carry them everywhere, and did not dare to intrust the box to anyone else to carry for me. I therefore restricted myself to a cigar-box full, chiefly Gortynas, two of them *Appassionata* and *Harrisii*, kindly lent me by Mr. Bird, and the rest from my own collection.

I sailed from Boston 26th March, via the Azores, Gibraltar, Marseilles and Genoa to Naples, where I landed on the 10th April. I reached London on 4th June, and the following week paid two visits of some hours each to the Entomological room of the British Museum.

I was unfortunate in missing Sir George Hampson, who was absent on sick leave, but every facility was given me for study, and I was much indebted to the courtesy of the other members of the staff. To guard against misconception, I wish to say that anything which I may say in regard to errors of determination is not to be understood as criticism of the officers in charge of that collection. No great collection can possibly be free from very many errors. No man can be thoroughly acquainted with the *Rhopalocera* or *Heterocera* of the world, and the enormous mass of material already there and the very large accessions which are constantly being received, render it impossible for the wholly inadequate staff to cope with the work.

If there is one criticism I would make it is that there seems to be too much of a tendency to find specimens to agree with the description of every synonym, and so to have one or more specimens standing under every name which has ever been given, which I think a great mistake, but to have a great national collection practically free from errors it would be necessary to call in experts in every group from all parts of the world, and have them working for months on the parts of the collection that they are competent to deal with, and that, of course, is manifestly impossible. My time was chiefly given to the *Gortynas*, and I made the following notes :

*Read at the Annual Meeting of the Entomological Society of Ontario, 27th Oct., 1904.

The drawers of *Gortynas* are not in a satisfactory condition, as specimens are much crowded and put together without sufficient discrimination.

Necopina.—Grote's ♂ and ♀ types, but no other specimens.

Medialis.—One fine specimen from F. H. Wolley Dod appears to be of the form named *Pallescens* by Dr. Smith.

Micacea, Esper.—There are many specimens put under this name, including Guenée's type of *Immanis* and *Amurensis*, Stgr. Also a specimen labeled *Obliqua*, Harvey, from Sierra Nevada, which does not appear to be that species, but rather *Immanis*, Gn.; this probably accounts for Dr. Smith's original statement, that there was no reasonable doubt of the identity of *Immanis*, Gn., and *Obliqua*, Harvey (Catalogue of NOCTUIDÆ, p. 175), which he afterwards withdrew in his revision (Trans. Amer. Ent. Soc., XXVI., 24), acknowledging *Obliqua* to be a good species.

Stramentosa, Gn.—The type and two other specimens.

Nitela, Gn.—The type and three other specimens.

Nebris, Gn.—The type and four other specimens.

Limpida, Gn —The type and three other specimens.

Cerussata, Grote.—One fine specimen from Mr. Bird.

Marginidens, Gn.—The type and two other specimens, all large specimens and flown and light in colour.

Rutila, Gn.
Harrisii, Grt.
Sauzalitæ, Grt.
} These are all put together as one species under Guenée's name, but erroneously so.

If Grote's description of *Sauzalitæ* as having a frontal protuberance is correct, a point which an entomologist of Sir George Hampson's ability could determine in five minutes, there could be no excuse for lumping it with *Rutila*, although, as far as I could see, the type looks exactly like that species. I am also satisfied that *Harrisii*, Grt., is distinct from *Rutila*, Gn., as the t. p. lines are different. I also satisfied myself that what we in Montreal have been rearing in abundance from burdock, and also from thistle, is the true *Rutila* from Guenée. The specimens standing under the name *Rutila* in the British Museum are as follows:

Guenée's type, which is rather faded. There are three other specimens of the same form, but all are in poor condition.

Grote's type of *Sauzalitæ*, which is in poor condition.

Two specimens marked "*Harrisii*, Grt., ♀ type"; these agree together in colour and markings and with Bird's specimen which I took over.

Over the label "var. *Harrisii*" are two specimens, one labeled:

GORTYNA, ♂ TYPE.
HARRISII, GROTE.

Is much deeper and brighter in colour than the other specimens of *Harrisii*, but appears to agree with them in markings. The other specimen is without label, but is a fairly fresh *Rutila*.

Purpurifascia, G. & R.—There are four specimens, which seem to be correctly named, but are in poor condition.

Baptisiæ, Bird.—One fine bred specimen from Bird.

Appassionata, Harvey, type.—In fair condition, but badly set and sprung, the wings sloping down. The fore wings rather narrower and slightly more elongated than in the specimens bred by Bird, but not quite so sharply pointed at apex as indicated in a drawing made for me by Mr. Knight. Hind wings with outer half more distinctly rosy than in Bird's specimen, and more distinctly limited on inner edge by median line. In my opinion there can be no doubt that the species bred by Bird from the Pitcher Plant *(Sarracenia Purpurea)* is the true *Appassionata*.

Buffaloensis, Grote's type, is the only specimen in the collection. The right primary is badly slit to the base, but the specimen otherwise is in good condition. It is of a rich red-brown colour.

Nelita, Streck.—Is not represented.

Impecuniosa, Grt., type.—In rather poor condition.

Cataphracta, Grt.—Three specimens, two being fairly fine.

Rigida, Grt., type only.—In poor condition.

Cerina, Grt., type—Large in size. Right side in poor condition, left side fairly good.

Erepta, Grt, type.—Unique. In rather poor condition. A peculiar-looking species. From "Douglass Co., Kansas, 900 ft. F. H. Snow."

Inquæsita, Grt.—Two fine specimens.

Up to 1900, when I presented a specimen of *Hepialus Thule*, Streck., to the Museum, that species was supposed to be lacking, but on this occasion, when looking over the drawers containing that genus to see if Grote's type of *H. gracilis* was in the collection, I discovered a specimen of *Thule* in fair condition, which has been in the collection ever since 1844, or for 31 years before the species was described. According to the

Museum register, it was collected by George Barnston in Hudson's Bay Territory, the locality, "Albany River, St. Martin's Falls," being enclosed in brackets, but as the entry applies to a number of specimens received in the same lot, it is impossible to be sure of the locality of this particular specimen. The specimen had been placed with *H. argenteomaculatus*.

I also looked hurriedly over the drawers of North American *Colias* and saw a number of errors. *Interior* was in one drawer, while the name *Laurentina* was put, as originally described by Scudder, as a variety of *Philodice*, but the specimens under this name were two albino females of *Philodice*, from Philadelphia, a rather narrow-bordered *Philodice* from New Brunswick and one set under side up.

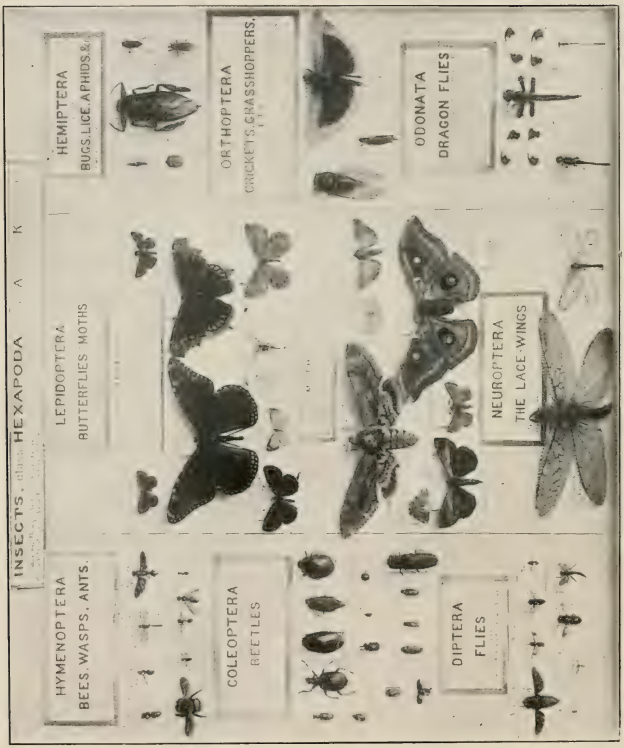
Two male specimens of *Colias*, which, according to the register, were taken in the Rocky Mountains by a collector employed by Lord Derby, about 1845 or 1847, and which, if I am not mistaken, stood in 1897 over a blank label, have now been labeled *Astræa*, Edwards, but are certainly not that variety. I may say that I have seen the type of *Astræa*, but do not consider it in the least entitled to a varietal name. It is a very ordinary form of *Christina*, and intergrades with the typical form. I noticed a number of other errors, some of which I pointed out to Mr. Heron, but of which I made no exact notes.

P. S.—Since writing the above I have received a letter from Sir George Hampson, in which he says :

"With regard to the specimens standing under *rutila*, they are exactly as Mr. Butler placed them, as I have not yet come to that part of the subject, and had not in any way studied them till I got your letter. *sauzalitæ* has the frontal prominence very distinct, it is a vertical flat plate, shaped like the letter D, the others have no frontal prominence. *rutila* has the postmedial line moderately bent outwards below costa, then oblique to vein 6, then inwardly oblique, whilst *Harrisii* has it strongly bent outwards below costa, then nearly evenly inwardly oblique to inner margin. We have the type and two other specimens of typical *rutila*, and the three types and two other specimens which I should put under *Harrisii*, but I am bound to confess that these last two specimens appear to be somewhat intermediate."

The two specimens regarded by Sir George as intermediate appeared to me to be merely *Rutila*.

Mailed January 7th, 1905.



A SCHOOL COLLECTION OF INSECTS.

The Canadian Entomologist.

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PRACTICAL AND POPULAR ENTOMOLOGY.—No. 2.

ENTOMOLOGY IN SCHOOLS.

BY H. S. SAUNDERS, TORONTO.

Having prepared a case of insects for a Toronto Public School teacher, for her class-room, I thought it might be a stimulus to others to do likewise, if the details were given some publicity.

All of us with medium-sized or large collections have duplicates enough from which to select material for such a case without impoverishing our collections, and now that so many public schools have departments of manual training there should be no difficulty in getting the teachers in these departments to co-operate by supplying the necessary cases. As a suggestion to manual-training teachers, the principal point in building insect cases is making them proof against pests; *i. e.*, tight-jointed. The simplest form of case would be one with a rabbet on the inside edge of the sides, into which a piece of glass could be placed and fastened with gummed paper. Sheet cork is necessary as a lining in the bottom of the case to hold the pins securely.

My idea in preparing the case was to give the scholars some knowledge of the leading characteristics of the principal orders and, with the specimens, fixing these points in their minds.

The accompanying plate needs no further explanation, except supplying what we are unable to read here on the labels. The pronunciation of classical names is indicated by very small hyphens and accent marks. Each label has a red border and black lettering. The size of the case is 19x16 inches. Most of the insects have individual labels on the pins giving the common name.

Insects, class Hexapoda, or the animal kingdom (from the Greek, hex—six, and pous—foot).—Air breathing, with distinct head, thorax and abdomen, three pairs of legs and usually one or two pairs of wings in the adult stage. Insects comprise four-fifths of the animal kingdom.

Order Hymenoptera (hymen—membrane, pteron—wing). Bees, wasps, ants.—Four wings, comparatively few or no transverse veins. Hind wings smaller than fore wings.

Order Coleoptera (coleos—a sheath, pteron—a wing). Beetles.—A pair of horny wing-covers, which meet in a straight line down the back, and beneath which there is a single pair of membranous wings. Eleven thousand known kinds in Canada and United States.

Order Diptera (dis—two, pteron—wing). Flies, mosquitoes, etc.—Only two wings.

Order Lepidoptera (lepis—a scale, pteron—wing). Butterflies and moths. Four membranous wings covered with overlapping scales. Seven thousand known kinds in Canada and U. S. Butterflies.—Clubbed antennæ; fly only in day time, and usually hold the wings erect above the back when at rest. (A few moths have clubbed antennæ, many fly by day, but no moth presents all three of the above characteristics). Seven hundred kinds in Canada and U. S. Moths.—Antennæ not clubbed; fly generally at night; wings not held erect when at rest. Six thousand four hundred kinds in Canada and U. S.

Order Neuroptera (neuron—a nerve, pteron—a wing). The Lace-wings.—Four wings with numerous veins and cross-veins.

Order Hemiptera (hemi—half, pteron—wing). Bugs, lice, aphides, etc.—With four wings, or wingless.

Order Orthoptera (orthos—straight, pteron—wing). Crickets, grass-hoppers, etc.—Four wings, first pair thickened and overlapping when at rest; second pair thinner and folded in plaits like a fan.

Order Odonata (odous—a tooth). Dragon-flies.—Four wings, finely netted with veins; hind wings as large, or larger, than fore wings; each wing has near the middle of the front margin a joint-like structure, the nodus.

NOTES ON THE LOCUSTIDÆ OF ONTARIO.

BY E. M. WALKER, B. A., M. B., TORONTO.

(Continued from p. 341, Vol. XXXVI.)

14. ORCHELIMUM VULGARE, Harr. The Common Meadow Grass-hopper.

Orchelimum vulgare, Harr., Ins. Inj. Veg., 1862, 162.

Xiphidium agile, Redtenb., Verh. zool.-bot. ges., Wien., 1891, 186 (in part).

Orchelimum agile, Scudd., Proc. Davenp. Acad. Nat. Sc., VIII., 1900, 73.

Measurements: Length of body, male 18 mm., female 18.5 mm.; of pronotum, male 5 mm., female 5.4 mm.; of hind femora, male 14 mm.,

female 14.5 mm.; of tegmina, male 20 mm. (18–24), female 19.5 mm. (19–25); of ovipositor, 8 mm.

This is the only species of *Orchelimum* that is distributed generally over a large part of the Province. It becomes gradually scarcer to the north of Lake Simcoe, and I believe it does not range much further north than Muskoka. I found it sparingly at Dwight, but it did not appear in Algonquin Park, nor did I take it at North Bay, although the proper sort of environment, apart from the northern latitude, was often met with.

This grasshopper is common in upland fields as well as low meadows, and is fond of perching in clumps of tall grass. It reaches maturity towards the end of July, and lasts until about the beginning of October.

The song of the male is the familiar "*xr*.....,*jip*,*jip*,*jip*, *xr*....., etc," of which an interesting and detailed description is given by Dr. Scudder in the Twenty-third Annual Report of the Entomological Society of Ontario, 1893, p. 73.

I have found great variation in the length of the tegmina and wings in this species. Individuals with unusually long tegmina, and wings which project some distance beyond them, are not uncommonly met with in the north. I have taken them several times at Lake Simcoe and also at Lake Muskoka, the Bruce Peninsula, and Walpole Id., River St. Clair. These long-winged individuals resemble *O. glaberrimum* in appearance, but are considerably smaller.

Localities: Rondeau, Sept. 14, 16, 1899; Point Pelee, Aug. 8, 1901; Arner, Essex Co., Aug. 9, 1901; Chatham, Aug. 10, 1901; Sarnia, Aug. 12, 1901; Walpole Id., River St. Clair, Aug. 13, 1901; Goderich, Aug. 18, 1901: Bruce Peninsula, Aug. 12, 1901; Burke's Id., Lake Huron, Aug. 29, 1901; Toronto, Aug., Sept.; Lake Simcoe, July 26–Oct. 1; Lake Muskoka, Aug. 10, 1899; Dwight, Sept. 2, 1902; Aug. 23, 1903.

15. ORCHELIMUM GLABERRIMUM, Burm.

Xiphidium glaberrimum, Burm., Handb. der Ent., II., 1838, 707.

Orchelimum glaberrimum, Scudd., Bost. Journ. Nat. Hist., VII., 1862, 453.

Measurements: Length of body, male 21.5 mm., female 20 mm.; of pronotum, male 5.9 mm., female 6 mm.; of hind femora, male 17 mm., female 19.2 mm; of tegmina, male 27.5 mm., female 28 mm.; of ovipositor, 8 mm.

On September 14, 1899, I captured 3 males of this fine species from the marshy shore of the "Rondeau," at Rondeau Provincial Park, Kent Co. I took them while stridulating, their song being indistinguishable, as

far as I could make out, from that of *O. vulgare.* They were found in company with the latter among the tall grass and sedge that border the "Eau." My single female was taken at Point Pelee from an open marsh bordering a creek, Aug. 8, 1901.

16. ORCHELIMUM NIGRIPES, Scudd.

Orchelimum nigripes, Scudd., Proc. Bost. Soc. Nat. Hist., XVII., 1875, 459.

Xiphidium nigripes, Redtenb., Verh. zool.-bot., ges., Wien, 1891, 188.

Measurements: Male, length of body, 19 mm.; of pronotum, 5 mm.; of hind femora, 17 mm.; of tegmina, 20.5 mm.

On Aug. 7, 1901, while collecting at Point Pelee, in a low wood bordering a stream, I heard a sound very like the stridulation of *Orchelimum vulgare*, but more subdued, the "jips" coming at much shorter intervals, and more of them produced at a time. After two or three attempts I succeeded in tracing the song to its source, and found an *Orchelimum*, quite new to me, which proved to be *O. nigripes.* I took another male in the same way, but, although I heard many more, I was unable to find any of them. In several cases the sound proceeded from trees, at a height of some ten or fifteen feet, but, as a rule, it came from tall weeds and vines which grow in great luxuriance upon the rich black soil. I also saw a male in an open marsh bordering the same creek, but failed to capture him.

17. ORCHELIMUM CAMPESTRE, Blatchley.

Orchelimum campestre, Bl., CAN. ENT., XXV., 1893, 91.

Measurements: Length of body, male 15–18 mm., female 16 mm.; of pronotum, male 3.6–4.2 mm., female 3.9 mm.; of hind femora, male 14.5–16 mm., female 15.2 mm.; of tegmina, male 20.5–26 mm., female 28.5 mm.; of ovipositor, 7 mm.

This slender and graceful species is probably confined to the south-western section of the Province, especially along Lake Erie, where it frequents open grassy marshes, like most of the other members of the genus.

Mr. Caudell, who kindly compared a pair of these insects with Blatchley's types of *O. campestre* in the U. S. National Museum, says that they agree perfectly with the latter. They are quite like a pair from Indiana, which I received from Mr. Blatchley, and are of about the same size.

Localities: Point Pelee, Aug. 8, 1901; Walpole Id., River St. Clair, Aug. 13, 1901; marsh near Rondeau, Kent Co., Sept. 15, 1899.

18. Orchelimum Indianense, Bl.

Orchelimum Indianense, Bl., Can. Ent., XXV., 1893, 90.

Measurements: Length of body, male 16.5 mm., female 15 5 mm.; of pronotum, male 3.4 mm., female 3.5 mm.; of hind femora, male 13.25 mm., female 14.5 mm.; of tegmina, male 18 mm., female 20 mm.; of ovipositor, 6.8 mm.

This is the smallest species of *Orchelimum* found in Ontario, and is readily known by the transparent whitish green of the tegmina, and the dark stripe down the middle of the face. My specimens appear to average slightly smaller than those from Indiana.

I found this pretty little species common near Sarnia, in a large tract of open grassy marsh land bordering the St. Clair River. This land had been entirely submerged earlier in the season, but when I visited the place the ground was dry and cracked. Several other interesting Orthoptera were taken here, among them *Conocephalus Nebrascensis*, Brun., and *Orphulella pelidna*, Haan, neither of which have been noted elsewhere in Canada.

I have also taken *O. Indianense* in open marshes at Arner and Walpole Id., in each case a single example.

Localities: Arner, Essex Co., Aug. 9, 1901; Walpole Id., River St. Clair, Aug. 13, 1901; Sarnia, Aug. 14, 1901.

19. Orchelimum delicatum, Bruner.

Orchelimum gracile, Brun., Can. Ent., XXIII., 1891, 70.

Orchelimum delicatum, Brun., Ent. News, III., 1892, 264.

Measurements: Length of body, male 18.5 mm., female 18 mm.; of pronotum, male 4.1 mm., female 4.2 mm.; of hind femora, male and female 16.5 mm.; of tegmina, male 20.3 mm., female 20 mm.; of ovipositor 10 mm.

I sent a female of this *Orchelimum* to Mr. Blatchley, who gave his opinion that it was probably *delicatum*, and kindly lent me a specimen from Indiana for comparison. This specimen closely resembles mine in every respect, except that the ovipositor is nearly straight, while in all of my three females it is distinctly curved. The comparative straightness of the ovipositor is one of the characteristics of *delicatum* as defined in Bruner's description, so that my specimens may belong to another species. They agree with *delicatum* in other important features, however, as, for instance, in the very delicate texture of the tegmina and in the unusual length and breadth of the ovipositor, and it seems better to regard them as the same species until the matter is settled by further collecting.

I found all my specimens among the tall grass and sedge of open marshes.

Localities: Rondeau, Kent Co., Sept. 14, 18, 1899 (1 male, 3 females); Point Pelee, Aug. 8, 1901 (1 male); Sarnia, Aug. 16, 1901 (1 male).

20. ORCHELIMUM GLADIATOR, Bruner.

Orchelimum gladiator, Brun., CAN. ENT., XXIII., 1891, 71.

Measurements: Female, length of body, 21 mm.; of pronotum, 5.5 mm.; of hind femora, 16.8 mm.; of tegmina, 20.5 mm.; of ovipositor, 10.5 mm.

I have but a single female of this insect, taken on Aug. 8, 1901, from a marsh bordering a creek, just above Point Pelee.

21. ORCHELIMUM VOLANTUM, McNeill.

Orchelimum volantum, McNeill, Psyche., VI., 1891, 26.

Orchelimum Bruneri, Bl., CAN. ENT., XXV., 1893, 92.

This species is very abundant in Southern Ontario and varies so much in size, according to locality, that I give the following measurements of average specimens from the Niagara River, where they are very large, and from Point Pelee, where they are much smaller:

		Length of body. mm.	Length of pronotum mm.	Length of hind femora. mm.	Length of tegmina. mm.	Length of ovipositor mm.
Niagara River.....	♂	20.0	4.0	16.5	24.0	
"	♀	24.8	4.9	19.7	30.0	10.5
Point Pelee.....	♂	17.5	3.7	15.7	19.0	
	♀	19.0	3.9	16.3	24.3	9.0

I first came across this species on the Niagara River, below Queenston, where I heard its peculiar note among the rushes growing in the water near the shore. I took a number of males by sweeping, but only one female. McNeill has well represented this song as "*Zip, zip, kr-ze-e-e, kr-ze-e-e.*" I have never noticed the preliminary "*zip, zip.*" The last part of the song does not last more than half to three-quarters of a second, but is kept up indefinitely.

At Point Pelee and Rondeau *volantum* is abundant in open marshes, bordering streams, and I came across it again at Sarnia among rushes and *Sagittaria* growing in a small pond.

Localities: Niagara River, Sept. 26, 1898; Rondeau, Kent Co., Sept. 15, 1899; Point Pelee, Aug. 8, 1901; Sarnia, Aug. 14, 1901.

(To be continued.)

FOUR NEW SPECIES OF HALICTUS FROM MAINE.

BY JOHN H. LOVELL, WALDOBORO, MAINE.

Halictus hortensis, n. sp. ♀.—Length, 5 mm. Head and thorax green, abdomen black, with the apical margins of the segments brown. Head nearly as broad as long, face finely and densely punctured, thinly clothed with a short white pubescence; mandibles bidentate, rufous at tips; antennæ black, pubescent, flagellum with minute appressed hairs, brownish beneath. Mesothorax nearly bare, finely and sparsely punctured; disc of metathorax rounded or somewhat triangular, evenly and finely rugulose or roughened. Wings hyaline, iridescent, nervures and stigma testaceous, tegulæ testaceous, pubescent, impunctate. Legs brown-black, tarsi ferruginous, hind spur with four long teeth. Abdomen impunctate, or with a few very fine punctures, the discs of the first and second segments bare and shining, the apical segments thinly clothed with a short white appressed pubescence.

I have taken this bee in my garden on the flowers of the rhubarb, blackberry, plum and rose. It is the smallest species of Halictus with which I am acquainted in this locality.

Halictus versans, n. sp. ♀.—Length, 6 to 7 mm. Head and thorax dark green, abdomen oval or elliptical, black. Head broad, face closely and finely punctured, clypeus dark purple, coarsely and sparsely punctured, fringed with ferruginous hairs; mandibles rufous at tips; antennæ black, flagellum slightly testaceous beneath. Mesothorax densely and finely punctured; disc of metathorax rounded, with fine radiating raised lines not extending to posterior margin; truncation with a medial fissure. Wings fuscous, stigma and nervures reddish-brown, tegulæ black with a piceous spot. Abdomen black, nearly bare, shining, a patch of white pubescence at base of second and third segments, apical segments very thinly and unevenly clothed with a whitish pubescence.

♂.—Length, 6 mm. Like the female, the coloration is unusually dark; antennæ testaceous beneath; disc of metathorax rougher, with a more or less salient rim. Two males taken on Solidago are referred to this species.

The female is described from specimens taken on *Epilobium angustifolium*; it has also been found on Solidago and other flowers. The head and thorax are a very dark green, the abdomen is remarkably regular

and oval, the segments closely imbricated and the sutures not at all prominent.

Halictus oblongus, n. sp. ♀.—Length, 7 mm. Head and thorax green, abdomen oblong, black. Breadth of head about equal to the length, face densely and finely punctured, clypeus with a few coarse elongate punctures, fringed with ferruginous hairs; antennæ black, testaceous beneath. Mesothorax minutely and closely punctured, nearly bare; disc of metathorax rounded, rugulose, raised lines extending to posterior margin, with a brassy reflection. Wings hyaline, slightly tinged with brown, nervures and tegulæ reddish brown. Abdomen unusually long, nearly bare, shining, apical segments with a very thin whitish pubescence.

♂.—Length, 6 mm. Slender, resembles the female; antennæ long, conspicuously testaceous beneath; disc of metathorax darker, not brassy; abdomen nearly smooth.

Both male and female specimens were taken on *Eupatorium perfoliatum*, August twenty-fourth. This species is distinguished by the unusual length of the abdomen.

Halictus nubilus, n. sp. ♀.—Length, 6.5 mm. Head and thorax green, with a brassy reflection, abdomen black, apical margins of segments broadly light brown. Head longer than wide, face finely and densely punctured, lower half clothed with a pale fulvous pubescence, clypeus purple, with a few coarse sparse punctures; antennæ black, flagellum pale brown beneath. Thorax clothed with a short pale fulvous pubescence; mesothorax sparsely and rather coarsely punctured; metathorax sharply truncate, disc bluish-green, coarsely rugose, rugæ extending to posterior margin, at each superior lateral angle there is a salient rim extending a short distance each way, centre emarginate; truncation grooved, pubescent. Wings hyaline, clouded with white, nervures light yellow, tegulæ impunctate, piceous. Abdomen without punctures, shining, the extreme sides of first and second segments and apical segments entirely covered with a rather dense fulvous pubescence.

Taken on *Iris versicolor* and *Solidago*. The four species described above belong to that section of Halictus for which Mr. Robertson has proposed the name Chloralictus.

ASSINIBOIA MICRO-LEPIDOPTERA, COLLECTED BY MR T. N. WILLING.

BY W. D. KEARFOTT, MONTCLAIR, N. J.

I am very much indebted to Mr. T. N. Willing, of Regina, Assa., for the privilege of working up a very interesting collection of Micro-Lepidoptera. It is particularly notable in recording a number of species that have hitherto been only known by the types, and especially so in establishing a wide range of territory to species that have been only recorded from California. Following this paper I have one in preparation on the same subject, from material collected in Manitoba by Messrs. Heath, Criddle and Dennis, to be followed in its turn by one on Micro-Lepidoptera from Western British Columbia, collected by Dr. Taylor and Mr. Bryant; later I hope to be in possession of sufficient material from the territory east and north of Toronto, which has been less worked than any part of North America, for a fourth paper. It is most gratifying to observe the very great interest in these small insects that has arisen throughout Canada.

TORTRICIDÆ.

Olethreutes consanguinana, Wlsm.—One specimen; Macleod, VII. 2. The most eastern record for this species, common in British Columbia and California.

Olethreutes deceptana, sp. nov.—Palpi, head and thorax pale gray, thickly sprinkled with darker gray atoms, antennæ pale gray. Front wing pale gray, marked with obscure darker gray. The darker shade forming a basal patch, a more or less obsolete middle fascia and streaks before outer margin. The basal patch covers on costal and dorsal margins a fifth of length of wing, but extends outward on middle one-quarter, the outer edge is slightly indented half way between middle and costa, below middle the edge is irregular and almost lost on its lower fourth. The basal patch is thickly covered with darker, nearly black strigulæ and dots, the former parallel to the outer margin of patch. Central dark fascia from middle of costa and narrowest just below costa; its inner edge slightly indented below costa, broadly indented on cell and slightly above dorsal margin; its outer edge is slightly indented below costa, deeply and narrowly at end of cell, thence obliquely towards anal angle, but before

reaching it abruptly turning downward into dorsal margin. Like the basal patch, it is transversely strigulated with nearly black lines and dots. A narrow dark half fascia arises just below middle of outer margin, proceeds obliquely inward towards costa at outer fourth, but terminates before reaching it; it is widest and rounded on its upper end. Between this short fascia and middle fascia, the narrow streak of lighter ground colour is divided by a darker line. The pale ground colour between basal patch and middle fascia, at apex and along outer half of costa is also strigulated with darker gray shades and dots. The costa is marked as follows: In basal patch with two dark dashes; in ground colour before middle fascia with four dark dashes; in middle fascia, the margins of which are nearly black, make two and between them a third dark dash; beyond middle fascia to apex are four paler ground colour oblique lines, each two divided by a darker dash and each with a darker dash in its middle. The inner pale-ground-colour line continues down to anal angle, the second and third merge together below and outline the upper end of marginal semi-fascia, and then continue around its outer edge to middle of outer margin; the fourth and outer pale line runs obliquely into outer margin below apex and outlines the darker apical spot. Cilia with seven whitish and seven dark gray spots, evenly spaced. Hind wing smoky fuscous, paler along costa and basally. Cilia paler. Under side: Front wing smoky fuscous, with whitish spots repeated from above along costa and outer margin; hind wing grayish fuscous, a shade darker at apex. Abdomen gray above; below and legs cinereous.

One ♂, Regina, VII., 20. Three ♂, Aweme, Man., VII., 24, to VIII., 8 (Norman Criddle). One ♂, Chicago, Ill., June (Jos. H. Reading). Co-types, U. S. Nat. Mus. No. 8205, Mr. Willing's and my collections.

I think this is the species that has been masquerading in our lists as *hartmanniana*, Linn., and propose to drop the latter name from our American list. I have a long series of *hartmanniana* from Europe, and a very careful comparison leaves no doubt of their separate identity. In *hartmanniana* the central fascia is differently indented, there is a tendency to its being entirely divided on cell by ground colour, leaving a conspicuous dash half fascia from costa and a dark shade on dorsal margin; there

is also a dark dorsal shade in *hartmanniana* from base to angle, which is entirely wanting in our American species.

Deceptana is not unlike *Archips afflictana*, Walk., but can readily be separated by structural characters. The ♂ of *afflictana* has a costal fold, which is absent in *deceptana*. The median vein of hind wing of *deceptana* is hairy at base above, which is not the case with *afflictana*. The costa of *deceptana* is more rounded or arched than *afflictana*. Zeller's identification of *hartmanniana* was from specimens collected in Mass. by Burgess. I am much inclined to the opinion that these specimens were *afflictana*, which is common in the Eastern States, or it is possible that they were more or less rubbed specimens of *albeolana*, Zell. By removing *hartmanniana* from our lists, Zeller's species *albeolana*, which has been listed as a variety of *hartmanniana*, will become a good species, and represent the very distinctly marked species, the larvæ of which are always found on birch *(Betula alba)*. *Hartmanniana*, according to Meyrick, feeds on Willow (Salix).

Olethreutes vetulana, *Wlsm.—One ♂, Regina, VIII., 30. Described from California and Texas and not since recorded. Type, 17 mm. Regina specimen 22 mm., and more of a dark chocolate-brown than California specimens and type, which are a reddish-brown.

Olethreutes campestrana, Zell.—Three specimens, Regina, VIII., 13, and Pincher, VII., 10; marked identically with Zeller's figure, but expanding only 12 mm. All other specimens in my collection and the types expand 16 to 18 mm. These may be diminutive examples of *campestrana* or a new species, but I would long hesitate describing as new anything in this genus with the characteristic white inner and outer bands and dark fuscous or dark-brown basal patch, central band and sometimes apical patch, forming four or five well-defined vertical fasciæ, as there are already seven species (5469 to 5475, Smith's List) so closely allied that I have yet been unable to separate them. Besides the above is a fourth specimen labelled Indian Head, VI., 29, that is darker and differing in the indentations of the white fasciæ, and especially in the ornamentation of the apical patch, which seems closer to *dealbana*, Walk., but is too badly rubbed to be positively identified.

*Smith's List, 1903, No. 5454, erroneously printed *vestulana*.

Eucosma Morrisoni, Wlsm.—Two specimens, Macleod, VII, 8, and Lethbridge, VII., 11. A trifle smaller and paler than Colorado and Montana specimens.

Eucosma circulana, Hbn.—One specimen, Regina, VI., 18. Same size, but differs somewhat from Eastern specimens, and additional material may prove it to be a new species, or at least a good variety.

Eucosma argentialbana, Wlsm.—Two specimens, Regina, VI, 18. I have no authentic specimens from Texas, where the types were taken, to make a comparison, but feel reasonably sure of this identification, although the Regina examples are more distinctly marked and capable of a much more clearly defined description than that of the type.

Eucosma culminana, Wlsm.—Two specimens, Regina, VIII., 13 and 15. This is a very interesting capture, described by Walsingham, 1879, from California. It has not since been recorded or, as far as I know, taken.

Eucosma illotana, Wslm.—One specimen, Regina, VI., 18. This is also an interesting record, as I am not aware of any printed record of its capture since Walsingham took it in Oregon more than twenty-five years ago. It is not, however, the most Eastern specimen, as I have one from Chicago, taken by Mr. J. H. Reading.

Eucosma Smithiana, Wlsm.—Two specimens, Macleod, VI., 25, and VII., 8. I am rather doubtful of this determination, the specimens are somewhat rubbed, but as far as can be seen agree with the description. If not *Smithiana*, I do not know of anywhere else to place them, and additional material may prove it to be new.

Thiodia dorsiatomana, sp. nov.—Palpi inwardly and basally white, outwardly and second joint above tinged with fuscous; head and patagia pale brown or fawn; thorax grayish-brown.

Front wing: Shades of pale olivaceous-brown or fawn, with a white divided median stripe, ocellic spot, sub-apical costa markings, and inner two-fifths of costa narrowly edged with white.

The brown shades are palest along the dorsum, below cell; between median streak and costa; above ocellic spot and in a narrow sub-marginal area. The white median streak extends from base to end of cell and is evenly divided its whole length by a narrow black line, a heavier black

line outlines the white streak below, and a less well defined one above. The inner half of costa is minutely dotted with brown. The dorsal margin from inner fourth to anal angle is distinctly marked with seven or eight equally spaced black dots. Ocellic spot, a broad horizontal white bar, with a luteous-white spot above and below it at each end; above and below the bar is a narrow, short black line, and beyond the two outer spots, two or three black dots. The outer two-fifths of costal margin covering a quarter of the width of wing is a beautiful scroll-work of geminate white lines, edged internally with black and enclosing three small spots of ground colour; the outer spot double the width of the middle one and the inner one but little more than an oblique streak. The inner pair of lines from costa just beyond middle, obliquely to and almost touching ocellic spot, the second pair are shorter and curve around parallel to costal, enclosing middle ground colour spot and joining third pair; the latter entirely enclose the large outer ground colour spot, and the lower line of this pair separates from its companion and dips down beyond and defining the ocellic spot, thence curves upward into apex, forming a white apical dash. Cilia long, whitish, finely speckled with gray inwardly, followed two narrow fuscous lines.

Hind wing: Dark smoky-brown, cilia gray, with a darker basal line. Abdomen above and tuft gray, below and legs whitish, tarsi shaded with brown.

Three ♂, expanse 17 to 19.5 mm. One ♀, 18 mm. Regina, VI., 15 to 18, Macleod, VII., 2. Co-types, U. S. Nat. Mus., No. 8210, Mr. Willing's and my collections.

Allied to *striatana*, Clem., *spiculana*, Zell., *argenticostana*, Wlsm., and *clavana*, Fern. Without any other characters a very easy means of distinguishing these species may be found in the scroll-work on costa before apex, which I purpose using later in synoptic tables; the species, all of which have the white or pale median streak, can readily be separated as follows: The white sub-apical streaks of *striatana* are broad, oblique and nearly straight, the inner and apical are geminated, the middle pair entirely separate. In *spiculana* the white costal streak runs into the inner pair, and there is only one broad white apical dash. The costal streak in *argenticostana* continues clear to the apex as a narrow line, the streaks are almost obsolete. *Clavana*, I have not seen, the description only says

"several oblique irregular streaks," very indefinite, but as this species is stated to have a double dark brown line below the white median streak, it should be readily separated.

I have two other specimens from Verdi, Nev., which do not seem to match any of the above and may be new, but await a larger series before describing.

Thiodia tenuiana, Wlsm.—One specimen, Regina, VIII., 13. This specimen is rather badly rubbed, but compares closely with an example so named by Prof. Fernald in the American Museum of Natural History. It is not quite like Walsingham's figure, which, with the closely allied species *parvana*, Wlsm., and *minimana*, Wlsm., are very poorly drawn, the descriptions are also so general that an actual comparison of the types will be necessary to properly separate them. Vein IV. of hind wing is entirely absent in this specimen.

Thiodia parvana, Wlsm.—Three specimens, Macleod, VI., 29, and Regina, VI., 10. I have but little hesitation in placing these specimens in this species; they agree with Walsingham's rather meagre description and indifferent figure, except that the hind wings are most distinctly fuscous rather than "very pale grayish white." Originally described from north Oregon, and not recorded since.

Thiodia refusana, Walk.—Two specimens, Regina, VI., 18. I feel certain of this identification, although both Walker and Walsingham's descriptions very inadequately describe this beautiful species. It closely resembles *Eucosma circulana*, Hbn., but can be quickly separated by the ♂ costal fold of the latter. The Regina specimens are yellowish-brown, or "cinereous-ochreous," except along the costa, which is whitish. The metallic lines are a dull leaden metallic, and form an almost perfect circle, involving nearly the entire outer third. Within the lower half of this circle is the ocellic spot composed of a cluster of velvety-black dots on a white field, and bounded outwardly on both sides and through the middle (vertically) by short metallic lines. In the upper half of the circle are three horizontal rows of black atoms. Between the circle and costa are a number of oblique metallic lines on a paler field; and through the middle of the wing, from base to circle, about one-third below costa, is a paler, nearly whitish line. The descriptions of *refusana* apply much better to *circulana*, especially where the ground colour is stated to be

"profusely irrorated with brownish scales." If further examination of Walker's type in the British Museum should show that it has a costal fold—the description states it is a ♂—*refusana* would fall as a synonym of *circulana*, and leave our present species without a name.

Thiodia triangulana, sp. nov.—Head and palpi cinereous or ashy-white, latter fuscous outwardly, thorax same, but posterior ends of scales and patagia cinereous.

Front wing divided into three nearly equal triangles, by two oblique fasciæ ; the inner from dorsum at first quarter continuing obliquely two-thirds across the wing, the outer from centre of costa to anal angle.

Costa almost straight ; outer margin oblique, 45°, straight in three specimens, very slightly concave in the fourth ; dorsal margin evenly convex. III. and IV. of hind wing stalked from two-thirds to four-fifths, length of stalk is not constant.

Fore wing : Ground colour varies from dead white to white with an olivaceous tinge, with olivaceous-brown fasciæ, spots and irrorations. An inner narrow fascia arises from inner fourth of dorsum and points towards the inner of the three pre-apical costal spots, but ends abruptly just above middle of wing ; it is more sharply defined outwardly than basally, and its outer margin is indented just above dorsum. The basal triangle within this fascia is thinly irrorated with the dark colour, more concentrated in a narrow line on costa, extending nearly to outer fascia and along the dorsal margin ; below and paralleling the costa are a row of dots, duplicated in a shorter row below middle ; between these are three faint horizontal lines, the lower one the most distinct, and in some specimens continuing outward, defining upper end of inner fascia, through outer fascia and ocellic spot. The outer fascia begins on costa and terminates in anal angle, before and defining ocellic spot ; its inner edge is less sharply defined than its outer, and is nearly straight, being sharply indented below middle by a narrow spur of white ; the outer edge curves outward as far as middle of wing, and below is sharply indented by the white ocellic spot. The basal triangle, thus enclosed, is crossed horizontally by faint lines of the dark colour, between the veins, the latter being white ; the dark colour forms a shade along the dorsum and in one (the freshest) example a small spot on dorsum at outer two-thirds.

The apical triangle, above the ocellic spot is the whitest part of the wing, irrorated with fuscous below and interrupted on costa by three well-defined, large costal spots, the outer the largest; a line of pure white surrounds these spots on all sides except the costal. The ocellic spot occupies the lower half of wing, bounded outwardly by a narrow, irregular, silvery-metallic line, beyond which are two to four small black dots, the spot is white and is crossed horizontally by a row of dark dots above, a faint line and a dark shade below; the silvery-metallic outer line, in some specimens continues around below the spot and up on its inner edge, almost completely encircling it. Before the cilia is a pure white line, from just below apex to dorsal margin and before this is a slightly wider fascia of the dark colour, which continues into the apex. Cilia white, lightly dusted with the dark colour.

Hind wing: Smoky, fuscous, rather shining; cilia pale fuscous, with three very narrow basal lines, middle fuscous, outer and inner, whitish.

Under side: Front wing, dark, smoky fuscous, paler along dorsum and costal spots darker, faintly outlined with paler scales, a white dash between outer spot and apex. Cilia same as above and preceded by a pure white line. Hind wing, grayish fuscous, becoming darker at apex and with one apical and two small costal dark spots. Cilia same as above. Abdomen, above and sides grayish, below each segment black anteriorly, cinereous centrally and gray posteriorly, giving it a very striped appearance. Legs: Femora, whitish gray, tibiæ and tarsi cinereous.

Described from four ♂'s. Expanse: 20 to 24.5 mm.

Two from Regina, VII., 18 and 20, and two Aweme, Man., VI., 29, and IX., 31 (Norman Criddle). Co-types, U. S. Nat. Mus. No. 8206, Mr. Willing's and my collections.

Since writing the above I have received from Mr. Ernest Oslar, several additional specimens, collected in Platte Canon, Colo., VIII., 16, and three specimens from unidentified material in U. S. Nat. Mus., collected by Dr. W. Barnes, Glenwood Springs, Colo., Aug. and Oct. The latter are of bright ochreish-brown shades, Oslar specimens olivaceous-gray. The maculation of all are the same; the species has therefore a variation in colour, from ashy-gray, through the olivaceous-grays to a clear ochreish-brown. (To be continued.)

PRELIMINARY LIST OF THE MACRO-LEPIDOPTERA OF ALBERTA, N.-W. T.

BY F. H. WOLLEY DOD, MILLARVILLE, ALTA., N.-W. T.

(Continued from page 28.)

[172. *Hadena allecto*, Smith.—The receipt of specimens of *mactata* from the east has caused me to doubt the distinctness of *allecto*.]

219. *N. havilæ*, Grt.—I confused this with the foregoing species until quite recently, so cannot state positively whether it is common or not. From memory I should say at least not rare. I picked four out of my series of twenty-five *clandestina* and sent two to Prof. Smith as possibly *havilæ*, but questioned their distinctness. He called them *havilæ*, and added, "The differences seem obvious enough in my collection. It has the ground colour of primaries lighter, has a peculiar strigate appearance, and lacks all the red-brown that occurs in *clandestina*." I much regret having confused the species, and being on that account short of material. My specimens are dated June 16 and July 18. Light.

220. *N. atricincta*, Smith.—Described from Calgary. The type is at Washington. A few are taken almost every year at light and treacle, though I have never seen it very common here in the hills. It was comparatively common near the mouth of Fish Creek (Bow Valley) in 1893, and may be of frequent occurrence there annually. It may be more of a prairie than a hill species, as I found it fairly common at treacle on the Red Deer River, about 50 miles north-east of Gleichen, in a strictly open prairie district, in the third week of June, 1901. End of June and July. A very variable species, some specimens being almost immaculate gray, and others very strongly marked. A striking feature, and one not mentioned in the description, is that in most specimens, particularly the ♀ ♀, the veins on primaries are conspicuously pale-lined. The t. a. and t. p. lines are often well marked in blackish, and the orbicular may be quite distinct. Secondaries generally smoky outwardly, occasionally pure pearly white. They sometimes have a smoky transverse central line. The species is figured with the description.

221. *Chorizagrotis auxiliaris*, Grt.—June and July.

222. *C. introferens*, Grt.—June and July. One specimen, Sept. 9th.

223. *C. agrestis*, Grt —June and July. One specimen, May 19th, and another "Circa Sept. 9th." Both dates seem exceptional.

224. *C. inconcinna*, Harv.—June. Have no July specimens, but it seems quite fresh up to the end of June.

The above four species, though scarcely to be met with at all some years, are decidedly common in others, *auxiliaris* being about the least common of the four. They come to both light and treacle, and may be found commonly in the daytime under loose boards and in similar situations. My material representing the group consists of about 150 specimens, the sexes being pretty evenly divided. I have always had some difficulty in separating the first two and the last two species, a difficulty in which I apparently do not stand alone. For instance, Sir Geo. Hampson, in his Catalogue, treats *introferens* as a var. of *auxiliaris*, and, incidentally, he places *soror* in the same position. With Prof. Smith's aid, however, who kindly sent me a named pair of each of the four from other localities, with explanatory notes on their distinctive features, I think I have my series of *auxiliaris* and *introferens* satisfactorily placed, though I still fail to be able to draw any line between *agrestis* and *inconcinna*. Touching the first two, he says: "They are not really difficult with a good series of each, provided you first separate the sexes, for, curiously enough, the ♀ ♀ of one species tend to resemble the ♂ ♂ of the other. The ♂ ♂ tend to a reddish shade and sharp markings; the ♀ ♀ to gray and obscurer types. *Auxiliaris* ♂ has a clear bright costal region; in the ♀ it tends to become concolorous, like the ♂ of *introferens*." Taken as a whole, *auxiliaris* seems to have the markings more clearly defined, show greater colour contrasts, and have a very conspicuously pale costa and collar. *Introferens* appears more sordid, browner, and has a much less contrasting costa, otherwise the maculation seems practically the same in the two species. But I have an almost intermediate series, though certainly leaning nearer to *introferens*, in which the colours are often rather bright and collar and costa suspiciously pale. Two ♂ ♂ of this series have, however, been labelled "*introferens*, very like the average Colorado specimens." I am not aware that either species has ever been carefully bred. "*Agrestis* and *inconcinna*," writes Prof. Smith, "are much less satisfactorily separated, and some examples seem as well placed with one as with the other name. They will never be really defined until a batch of eggs from a known ♀ has been bred to maturity." I have tried boxing ♀ ♀, but failed to induce them to lay. I see the larva of *agrestis* has been described by Dr. Dyar, and the description is

given in Hampson's Catalogue. I take it that typical specimens of *inconcinna* are more or less unicolorous, reddish-brown, the dark inferior portion of the reniform being the only really conspicuous marking, while *agrestis* is more variegated with distinct maculation. The latter species is immensely variable, and as I admit inability to make any really satisfactory separation of *inconcinna* the real range of variation in that is impossible for me to state. Grote described his *agrestis* as a variety of *auxiliaris*.

225. *C. terrealis*, Grt.—Very rare. One ♂ and four ♀ ♀ have been taken. Two ♀ ♀ July 6th, 1896; another Aug. 23rd, 1901; a ♂ July 5th of the same year, and a ♀ on June 30th, 1904. Prof. Smith has the ♂ and has seen three of the ♀ ♀. He says: "It is not the typical form, and comes from an unexpected locality; but the species of this genus are all widely distributed, and in the essential points agreement is sufficiently close to make me feel safe in the name. The typical form is more red-brown and the costal margin a little paler." My specimens are very dark brown, faintly tinged with chestnut. In one, the darkest, the maculation is obscured and the reniform rather faintly outlined in whitish and produced along median vein towards the orbicular, a character I can find in no other specimens of the genus. The other two have distinct maculation, and the discoidals, particularly the reniform, are conspicuously outlined in whitish, and are much paler centrally than ground colour. In none of them is there any sign whatever of a paler costa. The description in Sir George Hampson's Catalogue is, "Dark fuscous brown....the costal area brick-red," and in the figure this latter feature is as conspicuous as in *auxiliaris*, though, of course, the colours are different. It seems by no means improbable that the Calgary form is another species.

226. *C. balanitis*, Grt.—Has been rare of late years, but I have seen it very abundant, and then it was a bad pest at treacle. In 1894, near the mouth of Fish Creek, it positively swarmed. I have certainly seen *Noctua clandestina* in greater numbers, but not at treacle. I don't think I exaggerate when I say that on each of two consecutive nights in early July of that year I could have captured two thousand on not more than forty treacled posts. That was one of my earliest experiences of treacling in the Northwest. I never saw anything to equal the sight before, and though I have on one or two occasions since seen treacle almost or quite as prolific, one species has not so largely predominated. June to middle of August.

227. *Rhizagrotis flavicollis*, Smith.—Sometimes fairly common. July and August. The collar and costal region appear to be either ochreous or reddish, irrespective of sex, and in some ♀ ♀ gray, but I have no similar ♂ ♂.

228. *Feltia Hudsonii*, Smith.—(Can. Ent., XXXV., p. 130, May, 1903). Named after Mr. Arthur F. Hudson, who does a considerable amount of collecting in this district. The type, a Calgary specimen, is at Rutgers College, and two ♀ ♀ co-types are in my collection. Prof. Smith says in the description, "It is decidedly smaller (than *subgothica*) more slenderly built throughout, much paler in colour, with white secondaries in both sexes. The antennæ of the ♂ are less obviously "brush-like" than in the allies, and, altogether, the new form is perhaps the best defined of any in this series." I believe it to be a good species, though I for long confused it with *subgothica*. It averages smaller, though I have specimens of *subgothica* just as small. The build is lighter, and the insect has a more flimsy appearance. The antennæ are a little finer in both sexes, but I do not seem able to rely upon this as a distinguishing feature. The secondaries are smoky outwardly, as in the older species, but their ground is pearly-white instead of cream-coloured. I have, however, two ♂ ♂ from Victoria, B. C., which have secondaries almost as white as *Hudsonii*, but the stouter build of the specimens and darker colour generally place them with *subgothica*. I have seen it common at light with *subgothica*. End July and August.

229. *F. subgothica*, Haw.—Common. Middle July and August. At light, treacle, and sometimes on flowers in daytime.

230. *F. herilis*, Grt.—Usually rare. End July to middle August. Light and treacle. The species agrees with figure of *herilis*, in the November number of Can. Ent. for 1895.

231. *F. venerabilis*, Walk.—Common at light, treacle, and sometimes on flowers in daytime. Have occasionally bred it from "cutworm" larvæ found in gardens. Middle August to end September. The name is as given me by Prof. Smith some years ago, and ♂ specimens in my series are exactly like Dr. Holland's fig. 26 in pl. XXII. under that name, though the figure is stated by Mr. E. J. Smith in Ent. News, XV., 221 (June, 1904), to be that of *volubilis*. My ♀ ♀ are all darker than Dr. Holland's fig. 23, *volubilis*, and none have the round orbicular. Of Sir George Hampson's figures of the ♂ ♂ of both, my species is most like

that of *volubilis*, but has a very much more elongated orbicular, and is not so dark in colour. I have ♂ ♂ sent me as *volubilis* from Chicago, which are almost exactly like my species, but a little darker. Some Calgary specimens have the secondaries equally dark, but this is a very variable feature. My difficulty lies in my ignorance of the distinguishing points of the two species.

232. *F. Vancouverensis*, Grt.—A single ♂, dated June 9th, 1897, agrees fairly well with *Vancouverensis* that I have from Victoria, B. C., but is rather paler and not so heavily marked. The specimen is slightly rubbed.

233. *F. obliqua*, Smith.—(Can. Ent., XXXV., 5, p. 127, May, 1903). Not common. At light and treacle. June. Described from Calgary. The type is at Rutgers College, and I have two ♂ co-types. Rather like the preceding species, under which name I had it for a long time. Compared with that it is more unicolorous, and entirely lacks the purplish shading and the dark shade preceding s. t. line.

234. *Porosagrotis catenula*, Grt.?—I have three ♂ ♂ and two ♀ ♀ of a species to which Prof. Smith gave me this name some years ago. Dr. Fletcher, however, tells me that they are not a bit like *catenula* in his collection. My specimens are much more like Dr. Holland's figure of *vetusta* than Sir Geo. Hampson's of *catenula*, and of Sir George's description, agree rather with the former. I fancy the Calgary species is rather more common on the plains than in the hills. At light, treacle and sunflowers. End July and Aug.

235. *P. mimallonis*, Grt.—Very rare. Middle July to middle Aug.

236. [*P. orthogonia*, Morr.?]—A ♂ dated Aug. 22nd, 1895, taken at light, was so named, doubtfully, by Prof. Smith. It does not appear to be the same species as a ♀ sent me by Dr. Barnes, labelled "So. Utah." The Calgary specimen is badly rubbed, but I am unable to associate it with anything else in my collection.

237. *Euxoa rumatana*, Smith.—(Trans. Am. Ent. Soc., XXIX., 203, June, 1903). Described partly from Calgary material. The type is from Volga, S. Dak., and is at Rutgers College. Rather like *niveilinea*, under which name I had it for years, but differing chiefly in having dark margined secondaries. Very rare. August.

238. *E. plagigera*, Morr.—Not common. Light and treacle. July and August.

239. *E. olivalis*, Grt.—Common some years. July to middle Sept. My specimens entirely lack the pale contrasts shown in Holland's figure, and the costa is scarcely paler than the rest of the wing.

240. *E. maimes*, Smith.—(Can. Ent., XXXV., 5, 131, May, 1903.) Described partly from Calgary material. The type is a Calgary specimen, and is at Rutgers College. It stood for years in my collection, and was sent out as *Ridingsiana*, of which it appears to be the northern representative. In the description, comparing it with that species, Prof. Smith says, "it is smaller, darker, less powdery in the ♀ ♀, with rays on the veins even less marked In the ♀ ♀ the distinction is well marked, that of *maimes* differing little from the ♂, while in *Ridingsiana* all the examples of that sex are paler, more ashen, dusty gray, with less contrasting maculation." Common some seasons. End July to middle August.

241. *E. pugionis*, Smith.—Described partly from Calgary material. The type is from Colorado and is in the U. S. National collection. Formerly confused with *flavidens*. Comparing them, Prof. Smith says in the description, "In the new form the general colour is lighter, the contrasts are much greater, and the secondaries are pure white." In several of my specimens, however, the secondaries are distinctly smoky on the outer third, or even outer half. Rare. August and Sept. At light and flowers.

242. *E. cogitans*, Sm.—A fine ♂ at light. August 13th, 1903. Prof. Smith says, "A little smaller and not quite so well marked as my Colorado specimens, but the same, I think." Sir George Hampson treats *cogitans* as a synonym of *choris*, Harv., and I cannot be sure that his figure of that species is not the same as my specimen.

243. *E. perfusca*, Grt.—A ♂. July 26th, 1900. Smaller than Prof. Smith's examples from Washington, otherwise similar.

244. *E. punctigera*, Walk.—Rather rare, and all my specimens but one are ♀ ♀, that one having been taken *in cop.* It is redder than any of my ♀ ♀, and as a ♂ that I have from Regina, Assiniboia, is of much the same shade, the colour difference appears to be sexual. I had the name *titubatis* given me for this species, and have sent specimens out as such. *Titubatis* I have never taken here. July and August.

245. *E. acornis*, Smith.—Described from Calgary. An extremely variable species in both colour and maculation. I have 23 ♂ ♂ and one ♀, and no two are alike. The colour of primaries varies from pale creamy-luteous to almost slaty-gray. The maculation is sometimes practically obsolete, at others quite distinct. The transverse lines may be either geminate or single, and central shade distinct or wanting. The secondaries have generally more or less of a smoky terminal or subterminal shade, and sometimes also a median transverse line, but are occasionally pale smoky throughout. The figures of the species in Ent. News, VI., 10 (Dec., 1895), and in Sir Geo. Hampson's Catalogue are both good ones. The type is at Washington. I have seen the species very common at both light and treacle, but it has been a rarity of late years. Middle August to middle Sept.

245a. *E. megastigma*, Smith.—Described from two Calgary ♀ ♀. I suggested to Prof. Smith some years ago that, judging from the description, this seemed to be a var. of *acornis*, and he said he believed I was right. Though he lists it as distinct, he tells me he is still of the same opinion. I have no specimen in my collection named by him, and have nothing like Sir Geo. Hampson's figure of *megastigma*, which does not look to me like *acornis*, the space between discoidals being too dark, besides a general dissimilarity. The figure, however, is taken from the type, which is in the U. S. National Museum. Aug. 24th, Sept. 15th.

246. *E. scandens*, Riley.—A single ♂ in fine condition, taken by Mr. T. N. Willing at the Calgary town lights, on Aug. 1st, 1904, is evidently the same species as *scandens* sent me, named, from Chicago and from Cartwright, Man.

247. *E. vulpina*, Smith.—Described from Calgary. I have two fine ♂ ♂, all I ever saw besides the type. The figure in Ent. News, VI., No. 10, Pl. XV., is a good one, though in that in Sir George Hampson's work the maculation seems much too distinct. Both figures are of the type, which is in the Museum at Washington. The species is quite even in colour in both primaries and secondaries, and, except for the faintly pale-ringed discoidals, almost immaculate. It might be taken for an extreme form of *incallida*, but has more hairy thoracic vestiture. This fact, coupled with its later date of appearance, convinces me of its distinctness. Sept. 20th, Oct. 3rd and 15th, in different years.

248. *E. vallus*, Smith.—Described from a single ♂ from Laggan (B. C. in error), 5,000 ft. (Thos. Bean.) The type is at Washington, and

Sir Geo. Hampson's figure of it is unlike anything known to me Sept. 9th.

249. *E. pleuritica*, Grt.—Sometimes common. Prof. Smith says of a series I sent him, "Darker than normal, and much tending to *messoria*. Did the darkest example come to hand alone I should put it with *messoria* without question." I am not aware that I ever took *messoria* here, but have a few specimens from Eastern and Western States, from Vancouver Isl. and from Manitoba. Its resemblance to *pleuritica* is less apparent in a series than when single specimens are compared. *Messoria* has a duller, grayer appearance, and secondaries are paler. *Pleuritica* has generally both ochreous and rusty tinges, not present in any of my *messoria*. End June and July. Here I must mention that in this species, as in several others of the genus, there appears to have been, at some time or other, a serious error in association of type labels, or else wrong identification of types. Sir Geo. Hampson's figure of *insignata*, of which the types are in the British Museum (Nova Scotia specimens) is, I should say, without doubt, the species treated here as No. 248. *Insulsa* (type from Vancouver Isl.) is given as a synonym of *messoria*, of which the type is at Boston. The latter species is figured only by a very poor wood-cut. *Decolor*, of which neither the locality nor present location of the type are given, would seem to have been correctly identified as one of the forms of what has long been known in North America as *insulsa*. The matter requires probing to the bottom by those who have access to the older collections. Many of Walker's types are, I believe, impossible to identify with certainty.

250. *E. incallida*, Smith.—Used to be very common at light and treacle, but has been almost entirely absent of recent years. An enormously variable species, chiefly in number and intensity of markings. Some specimens are wholly suffused with black scales, and others are dark smoky-brown. Prof. Smith originally gave me the name *lutulenta* for this species, and referred *incallida* (in MSS.) as a synonym. Sir Geo. Hampson called my species *incallida*, and Prof. Smith tells me now that he is right, and that *lutulenta* is a good species. Of this he sent me an example from Glenwood Springs, Colo. This, from the predominance of pale markings, looks quite different from any of my series of over 50 *incallida* from the Northwest, but is not at all like Sir George's figure, which I can fairly well duplicate. I have a long series from Cartwright, Man., from Mr. Heath (supposed to include *5-linea*, probably a synonym,

according to Prof. Smith) which, as a whole, are smaller, less powdery, and lack that faint ochreous tinge present in all Calgary specimens. In fact, Sir George's figure of *incallida* resembles the Manitoba form, whilst that of *lutulenta* is much nearer the Calgary series. The two series look more distinct than many recently closely described species in the *Noctuidæ*, though the constrast is hardly apparent when single specimens are compared. However, I think it probable that, were more known of the geographical variation of this, as of so very many other poorly-defined forms, we should find that it had more synonyms already than have ever been suggested. Middle July to middle Sept.

251. *E. Laggana*, Smith.—Described from Laggan (B. C. in error), one ♂ (T. E. Bean). The type is in Washington, and is figured in CAN. ENT., XXXII., Pl. 5, and also in Sir Geo. Hampson's Catalogue, Pl. LXIV. The figures bear no resemblance to one another whatsoever.

252. *E. testula*, Smith.—The type is a Calgary ♂, and is in the U. S. National collection. It seems to bear no date. I cannot recall the specimen, but from Sir George Hampson's figure I strongly suspect that it is a form of *acornis*.

253. *E. differmis*, Smith.—A single ♂ at light, Aug. 16th, 1901, which Prof. Smith thinks must be this species. It is, however, not at all like Sir George Hampson's figure of the type.

254. *E. recticincta*, Smith.—Described from a single ♀ taken at light, August or September, 1894, and figured with the description. It still remains a unique. When more ♀ ♀ of *acornis* come to hand, this may prove to be a form of that very variable species. The type is in the Washington Museum.

255. *E. holoberba*, Smith.—Described from here. Very rare. July. Treacle. The type is at Washington, and is figured in CAN. ENT., XXXII., No. 8, Pl. 5.

256. *E. objurgata*, Smith.—I have taken ♂ specimens so named by Prof. Smith, and have two or three others which unquestionably fit into the series. To my eye, however, the form is poorly defined, coming from a group of over 70 specimens which have long been a puzzle to me, and to individuals of which Mr. Smith has at different times given me different names. For instance, I am unable to separate one of my co-types of *pestula* from Calgary so-called *objurgata*. I may be wrong, but feel sure that some of these species can never be separated without the most

careful breeding. Middle July and early August. My specimens in no way resemble Sir Geo. Hampson's figure, which has far more black markings. *Objurgata* was described from Pullman, Washington, and from Dakota.

257. *E. intrita*, Morr.—Used to be fairly common at light in the town of Calgary, and lower down the Bow near mouth of Fish Creek. It seems to be less frequent in the hills, and of late years I have rarely met with it anywhere. Prof. Smith originally cited the form as new, but subsequently wrote: "I have associated it with examples of *intrita* from Colorado and Washington. It is an obscure species." I should never have suspected that Sir George Hampson's figure was the same as the Calgary species, and am inclined to doubt it. July and August. *Intrita* was described from Vancouver Island.

258. *E. mollis*, Walk.—Two specimens only, both I think taken here in the hills. One, in 1894, is in the collection of Prof. Smith; the other, also seen by Prof. Smith, July 25th, 1898, is a ♂ in my own. My specimen is not quite like Sir Geo. Hampson's figure, but may be the same species. A ♀ taken at light on Sept. 3rd, 1904, is smaller, darker, and less clearly marked, but nearer to this than anything else I know.

259. *E. reuda*, Streck.—A single ♂, Aug. 10th, 1896. Damaged in mails. Prof. Smith calls it "*reuda*, rather a well marked form." It is not unlike Sir Geo. Hampson's figure, and may be the same species. I do not, however, recognize the form amongst a number of Euxoa sent me unnamed from Vancouver Island, supposed to contain *reuda*.

260. *E. rena*, Smith.—Used to be common at treacle, but very rare of late. I have specimens very like Sir George Hampson's figure (except in colour, which, be it said, in those plates is often very misleading). Middle July and August.

261. *E. insulsa*, Walk.—The species hitherto known by this name in N. America is one of the most regularly common of the genus here, but *insulsa* is treated by Sir George as a synonym of *messoria*. I have specimens approaching to, but not quite so contrasting as Hampson's figure of *decolor*, Morr., by which name the species may perhaps have to be known, if Sir George's diagnosis proves correct. A Manitoba series shows a much wider range of variation than the local captures. July and August. Light and treacle.

262. *E. albipennis*, Grt.—Fairly common some years at light and treacle. August and September.

263. *E. tessellata*, Harr.—Not common. Treacle. July to middle August. Exceedingly variable. I have ♂ ♂ in which there is a tendency to a paler shade on the costa, especially near the base. These bear a resemblance to some forms of *nordica*, insomuch that I have sometimes confused them. *Nordica*, however, besides being larger, seems always to have a bluish-gray ground colour, which this species does not possess. Prof. Smith has repeatedly seen my species, so there cannot be much doubt that it is the one designated in North American lists as *tessellata*. Sir George Hampson, however, recently had specimens from me, and says: "What you send as *tessellata*, Harr., I should call a dark variety of *messoria*. It is identical with the types of *insulsa* and *expulsa*, Walk." *Insulsa*, as I mentioned under that head, and *expulsa*, he considers synonyms of *messoria*. His reference of my No. 263 to *messoria* is puzzling. Moreover, in Vol. IV., p. 258, of his Catalogue, the type of Walker's *insignata* is stated to be in the British Museum, and is treated in the text as a synonym of *tessellata*. Yet, on p. 269, *insignata*, also Walker's species, and in the Museum, is treated as a prior name to *pleuritica*, so it would appear that Walker attached *insignata* type labels to different and generally dissimilar species. Taking the names as they now stand in our lists, whilst it is conceivable that bad or poorly marked specimens of *tessellata* and *insulsa* might be confused, or, still more easily, of *pleuritica* and *messoria*, it seems hard to understand that either of one pair could be mistaken for either of the other. Yet it is a noteworthy fact that each of the names, *insulsa*, *expulsa* and *insignata*, have been applied to one or both of each pair. Of the four species, *messoria* is the only one not yet recorded from Alberta.

264. *E. focinus*, Smith.—(Journ. N. Y. Ent. Soc., XI., 7, March, 1903.) Described partly from Calgary material. "It is the species," says Prof. Smith, "that I have mistaken for *friabilis* in collections, and have so named for correspondents.....It is an ally of *tessellata*, but grayer and narrower winged, with larger ordinary spots." I have one ♂ and seven ♀ ♀ bearing his own labels, but none of them bear any resemblance to what he has named *tessellata* for me. Both this and the following species, however, look to me like *nordica* without the black markings. A parallel variation is found in *ochrogaster* (vide infra). However, I have not yet heard of *nordica* from elsewhere in the range given for *focinus*, viz.: Pullman, Wash.; Glenwood Springs, Colo., and California. The type is at Rutgers College, but I am not sure whether it is a Calgary specimen. Rare. July and Aug.

265. *E. pestula*, Smith.—(Can. Ent., XXXVI., 150, June, 1904.) Described from twenty Calgary specimens. July, Aug. and early Sept. Of these, 4 ♂ ♂ and 8 ♀ ♀ are in my collection, all bearing Prof. Smith's own labels, 1 ♂ and 4 ♀ ♀ being labelled "co-type." Prof. Smith says in the description, "The relationship is to *messoria*, because of the obvious median line; but also to *tessellata* because the space between the ordinary spots is darkened. It is one of the group containing *incubita*, *terrenus* and *pleuritica*, differing from each as much as they do from each other." My remarks under *objurgata*, *focinus* and *nordica* should be here referred to. They comprise a "bunch" containing from seventy to eighty specimens at present in my collection, and, I fancy, over thirty more in that of Prof. Smith, which, though I have studied them through eleven seasons, have always been, and are still, a perfect puzzle to me, and certainly have been in the past to Prof. Smith also. It is with profuse apologies to him that I feel bound to state in explanation that I have no less than ten so-called specific names which he has either directly given to or suggested for different specimens of the group. I do not include *servitus* (vide infra), which I feel sure was a slip, nor *tessellata*, which I have more than once placed in the true *nordica* part of the group myself, but for which he was in no way responsible. I am quite unable to separate some of the specimens bearing his label, including co-types, of *pestula* from *focinus* and *objurgata* labelled by him. If there is any distinction, I can only recognize it between these and *nordica* by the existence in the latter of black markings. All three of the newer names (*i. e.*, except *objurgata*, one specimen of which I believe is a unique, as far as my collection is concerned) refer to enormously variable forms (?), and *pestula* and *focinus* can hardly even refer to varieties for that reason. Prof. Smith has, at different times, seen every one of the specimens I have referred to, except a few taken during 1904, and recently he saw over seventy of them all at once, so he should understand at least as much about them as I do, and it is not for me to sink any of the names. The group used to be fairly common, and eight or nine years ago I must have sent out some numbers, but of late years they have been so rare that I have never cared to risk spoiling ♀ ♀ on the chance of getting eggs. The type of *pestula* is in Prof. Smith's collection.

266. *E. basalis*, Grt.—Common. July and Aug.

(To be continued.)

PIERIS BRASSICÆ.

BY ALBERT F. WINN, WESTMOUNT, P. QUE.

On September 4th I found, feeding on leaves of Nasturtium, two larvæ which I had never seen before, and which agree exactly with figures and descriptions of the larvæ of the "Large White Butterfly" of Europe, *Pieris brassicæ*.

Both of these larvæ succumbed to attacks of Hymenopterous parasites, and while it is to be hoped that the rest of the larvæ in the neighbourhood have shared the same fate, it is scarcely likely, as there are large fields of cabbage within a short distance of the place where the two were found, and unless the winter kills them off, I fear we shall have another immigrant to add to our list, and a most unwelcome one. Next summer will tell the tale as to whether the species has established itself permanently or not, and any specimens seen should be at once reported.

NOTE ON SOME GEOMETRIDÆ IN THE HULST COLLECTION, RECENTLY EXAMINED BY DR. DYAR.

BY GEO. W. TAYLOR, WELLINGTON, B. C.

Dr. Harrison G. Dyar, in the Proceedings of the Entomological Society of Washington, VI., No. 4, has given us a very interesting and important paper on the Hulst collection of *Geometridæ*.

In this paper he has shown, from an examination of the type specimens, that a considerable number of Dr. Hulst's supposed species are not really entitled to specific rank. Of course, any entomologist describing as freely as Dr. Hulst did would be sure to make some mistakes and create some synonyms, and I have no doubt that Dr. Dyar is perfectly correct in his judgment in the majority of cases that he cites.

When, for instance, he tells us that the types of *Thallophaga fautaria* and *Tetracis hyperborea* are specimens of the well-known *Anthelia nigroseriata*, of Packard, we can readily believe it, because on referring to Hulst's descriptions we can see that *nigroseriata* must have been the insect before him, and so we cross *fautaria* and *hyperborea* off our lists, and it is the same in the case of most of the species with which Dr. Dyar's paper deals. But there are one or two cases in which, while not doubting Dr. Dyar's facts, I find I cannot accept his conclusions. In these cases the Doctor's determinations of the types seem to raise a real difficulty. For instance, he tells us that the type of *Somatolophia umbripennis* is a specimen (a single female) of *Alcis Haydenata*, and he adds, "Thus both genus and species fall."

Now, Hulst described *Somatolophia umbripennis* (Trans. Am. Ent. Soc., XXIII., p. 350) from a specimen or specimens, he does not say how many, from Colorado, and from the description I should have expected his type to have been a *male*, because he gives all the male characters in the new genus he proposes for the species, and says not a word about the female. He describes his genus *Somatolophia* minutely, telling us that the male has *no hair pencil* on the hind tibiæ, and has *long* pectinations to the antennæ, both characters at variance with the genus *Alcis*. He also tells us that the 1st and 3rd segments of the abdomen bear *dense* dorsal tufts of hairs, and in his description of the species *umbripennis* he adds that the hairs on the 1st segment in that species are black.

Now, it seems to me absolutely inconceivable that Dr. Hulst could have drawn up either the generic or specific description from a single female *Alcis Haydenata*. It is quite true that in the brief diagnosis of *umbripennis* there are many points of resemblance to *Haydenata*, and I have many times gone over the description with specimens of *Haydenata* in my hand, but I have always given up when I came to those dense dorsal abdominal tufts, which certainly are not present in the slightest degree in *Alcis Haydenata*.

The explanation suggesting itself to my mind is that Dr. Hulst had other specimens before him when he drew up his description of *S. umbripennis*, that he mixed with them this female *Haydenata* and that at some later date the original male type in some way came to grief, leaving only the female, which was not really conspecific, to represent the species in his collection. But the point I want to raise is this: Ought we to strike out the genus and species on the evidence of a specimen marked type when it is evident that that specimen was not the one from which the original descriptions were made? For my own part I doubt the propriety of doing this, so I shall for the present retain the names in the expectation that sooner or later the genuine *Somatolophia umbripennis* will come to light.

A similar case is that of *Diastictis festa*. Dr. Dyar says that the type is a specimen of the moth subsequently named by Hulst himself, *Deilinia pulveraria*. Here the description of *festa* (Trans. Am. Ent. Soc., XXVII., p. 335) is manifestly that of a *Diastictis*, not a *Deilinia*, and in this case, too, I am convinced that the specimen now doing duty as type cannot be the one from which the species was described. For the present, therefore, I retain *D. pulveraria* on our lists as a good species and not a synomyn of *festa*. The moth in question *(pulveraria)* is not rare in the Kootenay district.

CORRECTIONS IN EVANIIDÆ, ETC.

BY J. CHESTER BRADLEY, ITHACA, N. Y.

In Schletterer's "Die Hymenopteren Gruppe der Evaniiden," Annalen d. k. k. Nath. Hofmuseum Wien, IV., p. 311, read *trochanterata*, Cameron, for *trochanterica*, Cameron. Page 338, the locality for *Evania semirubra*, Cresson, should be Cuba. Page 118, in synonymy of *Evania*, date 1829, after "*Evania*, Curtis," should come the following reference: "*Brachygaster*, Stephens, Systematic Catalogue of British Insects. I. p. 343, 1829. On page 143, under synonymy of *Evania minuta*, the same reference, *Brachygaster minutus*, Stephens, should be put in after *Evania fulvipes*, Curtis. In Dr. C. G. De Dalla Torre's "Catalogus Hymenopterum," Vol. III., p. 1076, under *Evania*, *Brachygaster*, Leach, Edinb. Encycl., 1817, should be struck out and *Brachygaster*, Stephens, Syst. Cat. of Brit. Insects, 1829, replace it. Leach, in the reference given simply under a description of *Evania minutus*, states as a synonym "*Brachygaster minutus*, Leach, Mss.," which is not even an attempt, let alone sufficient to establish a genus. So a corresponding change should be made after *Evania minuta*, Lamarck, on page 1082. Thus we have 1829 as the date of establishment of the generic name "*Brachygaster*," but in 1826 it was used for a genus of Diptera by Meigen. Hence it falls as a homonym, and as the genus is to-day recognized, I propose the change:

BRACHYGASTER, Stephens, name preoc. = SEMÆODOGASTER, new name.

In plate I., Dr. Schletterer, has represented (figs. 5 a–e) veins that are atrophied and visible only as mere traces. This is apt to cause confusion, as they are so strongly drawn as to give the impression of distinct veins. *E. amazonica* (fig. 5 e) can scarcely show a trace of an extra vein between the transverse discoidal and transverso-medial veins. Such a condition is not found in any Hymenoptera higher than Phytophaga, and Dr. Schletterer must have mistaken a mere coloration for a trace of a vein. The more correct figuration is shown in Kieffer's "Evaniidæ," in Wytsman's "Genera Insectorum," plate I., fig. 7.

Kieffer, in Zeitschr. fur Hym. u. Dipt. III., p. 111, establishes *Pseudevania* for *E. trochanterata*, Cameron, and *marginata*, Cameron, without giving any characters. The two are utterly unlike and generically

distinct. *Evania marginata* is by far the most distinct, and from Cameron's descriptions and figures worthy of generic rank. So we will call it the type of *Pseudevania*, while *trochanterata* falls back into *Evania*.

In Kieffer's "Evaniidæ" of Wytsman's Genera Insectorum, p. 2 and elsewhere, I would call attention lest someone should not understand him, that by "Ashmead, State Board of Agric., U. S. A., Catal. Ins.," he means Smith's list of the insects of New Jersey. P. 5. *Brachygaster floridanus*, *Johnsoni*, and *Weithi*, Ashmead, should be listed under genus *Hyptia*, as Dr. Ashmead placed them in their original descriptions. P. 6. The absurdity of erecting Foeninæ as a sub-family on the genus *Gasteruption* is evident. It should be *Gasteruptioninæ*. Kieffer overlooks Ashmead's "Classification of the Ichneumonoidea," Proc. U. S. Nat. Mus., 1901, in which this sub-family had already be recognized.

In Dr. Ashmead's "New Species of Evaniidæ," Can. Ent., 1901, p. 303, *Hyptia Johnsoni* should have the locality *Jamaica*, instead of Philadelphia.

EVANIELLA, n. gen.

Evania Neomexicana and *E. Californica*, p. 304, belong to a new genus, which I shall shortly describe under the name *Evaniella*. Here also belongs and stands as type the species which Dr. Ashmead (p. 304) calls *unicolor*, Say, but is not that species. Say's description applies to *E. appendigaster*, which could easily have spread into the interior with the early settlers, inasmuch as it is parasitic on cockroaches.

Hypolaepus Viereckii, Bradley, Can. Ent. 35, p. 47, Dr. MacGillivray kindly points out to me is synomymous with *Pteronus ventralis*, Say. It is identical in characters with *Hypolaepus*, to which it would run in Dr. Ashmead's tables. The value of the characters is doubtful.

The following typographical errors occur in an article by the writer on the Genus *Platylabus* in Can. Ent. 35, p. 275: Page 277, under heading 1, paragraph beginning "Metallic blue" should be co-ordinate with the first, and should end with a reference to (4). "4. Abdomen more or less rufous" should have after it a reference to (6). Page 279, "*Luzernenis*, n. sp.," should read "*Luzernensis*, n. sp."

NEW NOCTUIDÆ FOR 1905—NO. 1.

BY JOHN B. SMITH, SC. D., NEW BRUNSWICK, N. J.

MINOFALA, n. gen.

Head of moderate size, not retracted; eyes round, hardly prominent, yet distinct and of good size; front protuberant inferiorly, with a roughened depression guarded by a sharp rim; palpi small, slender, not attaining the end of the protuberance; tongue weak, yet of moderate length and, perhaps, functional; antenna in the male with the joints a little marked, ciliate rather than bristle tufted. Thorax oval, convex, collar and patagia distinct but not uplifted; vestiture scaly; no tufts; legs moderate, of normal proportions, without spines, spurs or other armature save the usual spurs of tibiæ. Abdomen cylindric; well exceeding the secondaries; untufted. Primaries elongate triangular, apex well drawn out, though not acute, outer margin oblique; venation apparently normal. Secondaries trigonate, proportionate.

MINOFALA INSTANS, n. sp.

Ground colour a dirty, pale luteous, overlaid by smoky scales and relieved by white scales. Head and thorax of the ground colour, lightly irrorate with black scales. Primaries with all the maculation obvious; a blackish, diffuse shade from the middle of t. a. line to outer margin above the middle, forms the salient feature of the wing. Basal half line marked by a geminate dusky spot on costa and by dusky and white scales below that point. T. a. line geminate, much broken, defining lines dusky, included space whitish, very irregular and with large angles. T. p. line geminate, much broken, defining lines blackish, slender, included space more or less white, well removed outwardly, abruptly bent from costa over cell and obliquely incurved below. S. t. line very close to margin, white, irregular, two little teeth on veins 3 and 4 reaching the outer margin. The apex is pale and a dusky shade precedes the line; below is a pale shade from reniform above a pair of sagittate spots which continue the dark median shading and beyond which the terminal space is also dark. There is a broken black terminal line. The fringes are long, luteous-gray, cut with whitish. There is an obscure median shade line, obvious only toward inner margin. The claviform is indicated by brown scales. Orbicular small, round or nearly so, whitish, edged with black scales. The

reniform is obscured by the dusky shading and has no defining lines. Secondaries whitish with a smoky outer border, an incomplete smoky extra median line and a dark discal lunule. Beneath, primaries smoky, paler outwardly, this lighter space crossed by two dusky lines. Secondaries whitish, powdery, a little infuscated along the costa and outer margin, with an outer dusky line and a dusky discal lunule.

Expands: 1.05 inches = 26 mm.

Habitat: Galveston, Texas, in May.

One male in good condition, from Prof. F. H. Snow, is the generic and specific type. The general resemblance to *Fala ptychophora*, Grt., is obvious, but this is a much smaller insect.

Leucania pendens, n. sp.

Ground colour dull reddish-luteous with smoky shades and powderings. Head with smoky powderings. Collar with three transverse leaden gray or smoky lines, of which the middle is narrower than the others, the upper being just below the tip. Dorsum smoky, as is also a narrow submarginal line on the patagia. The primaries have much the appearance of *unipuncta*, with the strigate tendency of *phragmatidicola*. A smoky streak extends along the median vein to the end of the cell and beyond it between veins 4 and 5 to the sub-apical shade, into which it merges beyond the t. p. line. The white dot at the end of the median vein is included in this shading. There is a distinct black spot below the streak at the place of the t. a. line. T. p. line consists of an even series of black venular dots. The fringes are dusky. There is a vague dusky shade on costa before the apex and another below it, leaving the apical area a little lighter; but there are no strong contrasts. Secondaries smoky, whitish at base, veins smoky, fringes yellowish. Beneath, pale luteous, lustrous, disc and fringes of primaries dusky; secondaries paler, powdery along the costa.

Expands: 1.32 inches = 33 mm.

Habitat: Chokaloskee, Florida, in May.

One female in very good condition, from Mr. George Franck. The species is obscure in appearance and has resemblances in all directions. The most characteristic feature seems to be the dusky central streak which extends, without break other than the inclusion of the reniform, almost to the outer margin.

EUCALYPTERA GIGANTEA, n. sp.

Ground colour white, overlaid by a creamy tint, uniform, lustrous. Head, thorax and abdomen immaculate. Primaries with a black streak through the centre, starting as a point in the cell near the base, extending just above the median vein and broadening very slowly to near the middle of the outer margin, but a little distance from it, where it ends somewhat diffusely. Secondaries a little whiter than the primaries, immaculate. Beneath powdery: primaries suffused with blackish along the costa and through the centre; secondaries with costal area dusky. The legs are stout and very heavily clothed with hair.

Expands: 1.56 inches = 39 mm.

HABITAT: Galveston, Texas, in May.

One male from Prof. F. H. Snow, in good condition; but becoming greasy. The primaries are narrower than usual, and that character, with the large size, heavy body and simple maculation should make the species an easily recognizable one.

LYTHRODES SEMILUNA, n. sp.

Ground colour white, with a faint olivaceous tinge. Thorax mottled with olivaceous scales; defective. On the primaries the basal area is clear nearly to the middle, then comes an olivaceous brown shade extending from costa to inner margin, incurved, the inner border fairly defined, the outer diffuse and shading into the ground to a point beyond the cell, where another shade, starting from costa before the apex, curves inward and again outward to the outer margin at vein 3. This darker area also lightens outwardly, leaving the apex of the ground colour, and the veins through this area are also white. The ordinary spots are indicated; the orbicular by blackish scales on the inner shading, the reniform by a dusky slender lunule at the end of the cell. Secondaries white, with a narrow smoky margin. Beneath, primaries smoky, fringes white: secondaries white, with an extra median and marginal dark band and a small discal spot.

Expands: .80 inches = 20 mm.

HABITAT: Cochise County, Arizona, April 8.

A single male specimen from Mr. George Franck. The body is defective; but the wings are in good condition and, while the markings are really very different from those of all the other species, the characteristic strigate appearance is obvious.

PHURYS CAMPANILIS, n. sp.

Ground colour of head, thorax and primaries a deep, dark bluish-gray, the maculation smoky-brown or black. Head and thorax immaculate. Primaries, t. a. line a somewhat diffuse blackish outer line, preceded by a somewhat indefinite orange line; outwardly oblique, with outward little teeth on the veins and incurves in the interspaces: t. p. line geminate, the defining lines diffuse, black and irregular, included space broad, orange in colour, conspicuous; in course almost rigidly upright. The main part of this t. p. line is really the orange centre, which is continuous; the preceding line is broken and not well marked except on costa and inner margin; the following line is broader, well marked, expanding into an oval spot in the sub-median interspace and again opposite the cell. S. t. line seal brown, narrow, outwardly denticulate on the veins, incurved in the interspaces, preceded by undefined paler shades. A series of terminal, venular, blackish dots. Fringes concolorous. Orbicular wanting. Reniform black, oblong, oblique, of moderate size, not well defined. Secondaries deep ochraceous overlaid by smoky, with a vague yellowish median shade and a subterminal denticulate line, only recognizable on close examination. Beneath, uniform tawny-yellow, with leaden-gray fringes.

Expands: 1.40 inches = 35 mm.

HABITAT: Chokaloskee, Florida.

One male, in good condition, from Mr. George Franck. Most closely allied in some respects, to *P. ovalis*, Grt.; but obviously distinct by the irregular t. a. line and the vaguely marked secondaries.

PHURYS CAROLINA, n. sp.

Ground colour smoky-brown overlaid by violaceous gray. Head and thorax immaculate. Primaries with the maculation evident in the male, barely indicated in the female. T. a. line obscure, smoky-brown, diffuse, even, outwardly angulate on the median vein. T. p. line geminate, evenly outcurved over the cell, then almost evenly oblique to the inner margin; the inner defining line is a narrow edging of brown scales which may be traced through the full course; the outer line is broader, deeper brown, a little diffuse and at about vein 5 joins an oblique streak of the same colour that extends to the apex; the included space is yellow and also follows the apical streak, only scattering yellow scales attending the real line to the costa. The first appearance, therefore, is that of an oblique double line from apex to inner margin, one-third from anal angle. S. t. line

wanting. There is a narrow brown crenulate terminal line, emphasized by better defined blackish interspacial dots. Orbicular wanting. The reniform is a vague, undefined, oval, blackish spot. Secondaries dark smoky brown, without obvious markings. Beneath, yellowish with smoky powderings and an ill defined discal spot on all wings.

Expands: 1.36 inches = 34 mm.

HABITAT: North Carolina, in August.

One male and one female; the former in very fair, the latter in defective condition. I have no recollection as to the source of the specimens and no indication as to more exact locality. The difference between the sexes is striking; but whether it is always so I am not able to say. The species belongs with *glans*, Grt., and *flavistriaris*, Hbn., which is not the same as the *flavistriaris* of Guenee. I have notes on all the type specimens in European Museums, but have been unable to get material upon which I might base a revision of the species, some of which are wrongly named in nearly all collections.

BOMOLOCHA HEULOA, n. sp.

Ground colour dull, dark smoky-brown, all the maculation obscure. Head and thorax concolorous with primaries, not maculate; abdomen with dorsum a little darker, the sides a little paler than secondaries. Primaries with median lines narrow, just defined, black with a vague paler edging outwardly. T. a. line upright, regular bisinuate. T. p. line at or a little beyond the middle, roughly parallel with the outer margin, drawn in below the cell, more or less outcurved above and below that point. S. t. line punctiform, blackish, variably defined, a little sinuate. Terminal line blackish, broken, sometimes not traceable; fringes concolorous. The orbicular is a small patch of black, elevated scales. The reniform is a narrow curved line of such scales, outwardly with a vague paler shading. Under the lens the surface appears flecked with metallic-blue scales. Secondaries a little lighter than primaries and palest at base. Beneath with a grayish tinge, powdery; secondaries with a discal dot and traces of a powdery median shade line.

Expands: 1.18–1.24 inches = 29–31 mm.

HABITAT: Cochise County, Arizona, in July.

One male and two females in passable condition, from Mr. George Franck. As is usual in this genus, the male is a little larger and more robust than the female, and also a little more sordid in colour. The primaries are distinctly angulated at middle of outer margin in all the specimens; but in the females the angle is better defined and there is a

distinct excavation below the apex. In wing form, dark colour and similarity of sexes the relationship is closest to *B. toreuta*, Grt.

HYPENULA CAMINALIS, n. sp.

Ground colour smoky-blackish, with all maculation fragmentary and obscure. Head, thorax and abdomen concolorous. Primaries with the median lines denticulate, black, scarcely or not at all relieved from the ground colour. T. a. line irregular, but on the whole nearly upright. T. p. line rather evenly bisinuate. S. t. line very narrow, pale, irregularly dentate. A very narrow pale terminal line and a series of preceding black spots. The reniform is a narrow, upright, yellowish mark, scarcely relieved. Secondaries with a dusky extra-median shade and a paler submarginal line. Beneath, paler than above, powdery, more yellowish toward base, a common extra-median shade line and an s. t. line which is pale, broken on the primaries and continuous on the secondaries.

Expands: 1.12–1.25 inches = 28–31 mm.

HABITAT: Cochise County, Arizona, June and July.

Two males and seven females; all in rather poor condition, from Mr. George Franck. The species is obviously allied to *acuminalis*, but is decidedly blackish instead of brown, and it lacks the white scales characteristic of the Texan form. It seems also, on the whole, a little smaller. The specimens had been papered and are all defective as to legs.

RENIA RIGIDA, n. sp.

Ground colour dull reddish-gray with a smoky shading which forms the basis of the maculation. Head and thorax concolorous. From the base to the median shade the primaries are of the reddish-ground and contrast a little against the rest of the wing. The t. a. line is obscurely indicated in the male, as is also the orbicular spot. The median shade is broad, outwardly diffuse, makes the most conspicuous part of the maculation and extends rigidly oblique from the basal $\frac{2}{3}$ of the costa to the same point on the inner margin. T. p. line single, crenulate, somewhat diffuse inwardly and merging into the dark median area, squarely exserted over the cell, then very oblique inwardly to the inner margin. The reniform is upright, narrow, dusky with a vague paler margin. S. t. line is a more or less obvious black shading before a fragmentary pale line which is a little irregular, but on the whole parallel to the outer margin in course. There is a series of black terminal dots on the interspaces, where the margin is a little notched. Secondaries a little more blackish in tint, without obvious

maculation. Beneath powdery, primaries darker with a vague tendency to reproduce the maculation of upper side : secondaries paler, darkening outwardly ; with two smoky bands across the disk and, in the outer dark space, a narrow, pale, submarginal line.

Expands : 1 inch = 25 mm.

Habitat : Oak Creek Canyon, Arizona, 6,000 feet, August.

One male and one female in fair condition, from Prof. F. H. Snow. The species is one of the smallest of the genus and belongs with *sobrialis* and *larvalis* as well by general colour as by the angulated exterior margin of primaries. It differs at once, however, in the very distinct, rigidly oblique median shade as well as in the details of the maculation generally.

Simplicia albisinuata, n. sp.

Ground colour deep smoky-brown, no contrasts except for the sinuate, white s. t. line of the primaries. Head and thorax concolorous, the abdomen paler. Primaries with the median lines vaguely traceable, darker, irregular. S. t. line obvious or prominent ; pale or even white, with an obvious incurve opposite the cell, else rather even. Terminal line pale, narrow, sometimes obsolete, preceded by blackish lunules, the fringes slightly indented. Orbicular a diffuse spot, a mere dot, or altogether wanting. At its best with a bluish white central dot. Reniform large, kidney shaped, always in part obscure, sometimes a diffuse blotch, usually with the inner margin marked by a few bluish white scales with a blackish surrounding. Secondaries with an extra median paler shading, vaguely marked ; the fringes a little paler. Beneath a little paler and less smoky than above, more powdery ; with a whitish, irregular s. t. line, broken on the primaries and, on the secondaries, a somewhat obscure median shade line and discal spot.

Expands : 1.38–1.50 inches = 34–37 mm.

Habitat : Cochise County, Arizona, July and August.

Three males and three females from Mr. Franck, all received in papers and in more or less defective condition. In 4 of the examples the apices of primaries are distinctly acute, in the others the wing is broader, all the margins a little fuller and the apex not so obvious.

This is the first occurrence of this interesting Central American genus in our fauna and the species is evidently allied to *aonia*, Druce, recorded from Panama and Guatemala. In the lists the species may be placed next to *Palthis*, with which the genus agrees in the exaggerated tufts of the legs and palpi in the male.

THE ENTOMOLOGICAL CLUB OF THE A. A. A. S.

A meeting of this club was held in the rooms of the American Entomological Society in Philadelphia on Friday evening, Dec. 30, 1904. Over thirty persons attended. The President, Dr. Henry Skinner, spoke of the meeting of the Club held 20 years before in the Hotel Lafayette in Philadelphia. Mr. H. A. Morgan was elected President and Mr. G. W. Herrick Secretary for the New Orleans meeting. Dr. Skinner was elected Permanent Secretary. The report of the Committee on a National Organization of Entomologists was read and adopted. It provided for the appointment of a committee which should communicate with certain Entomological Societies, inviting each to add a member to the committee, and when thus formed it should prepare a constitution, by-laws and plan of work for an association of North American Entomologists, and call a meeting in 1905. Dr. John B. Smith, Dr. James G. Needham and Prof. C. P. Gillette were appointed on this committee.

The President spoke of the history of American Entomology, especially of Thomas Say, and exhibited a set of albums belonging to the American Entomological Society, containing the photographs of many older as well as contemporary entomologists. All were invited to contribute to these. Mr. Rehn exhibited numerous old and rare entomological works and editions. Dr. Cook stated that the Gundlach collection was in an excellent state of preservation in Havana, where was also Poey's collection.

Dr. MacGillivray spoke of the Comstock-Needham system of wing venation. He claimed that it represented the real homologies of the veins in all orders. In practically all saw-flies the radial sector arose from the base of the stigma, and what appears to be the base of the radial sector from near the apex of the stigma in all higher Hymenoptera, but he had recently proved that in reality the base of the radial sector has been lost in the latter case, and the radial cross-vein has assumed its functions. He showed that specialization had occurred by addition in such orders as Odonata, and by reduction in Diptera, etc. The subject was discussed by several members. Dr. Fernald complained of the inaccuracy of the terms used in the question of mimicry. He placed on the board a tentative table to classify such phenomena. Mr. Summers put a similar table on the board. The subject was discussed at length. Mr. Washburn then spoke of the attractions Minnesota offered to the entomologist, and the meeting then adjourned.

J. Chester Bradley, Sec. pro tempore.

Mailed February 4th, 1905.



THE VARIATIONS OF ARCTIA PROXIMA, GUERIN.

The Canadian Entomologist.

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CONTRIBUTIONS TO THE KNOWLEDGE OF NORTH AMERICAN ARCTIIDÆ.—IV.*

BY OTTO SEIFERT, NEW YORK.

Arctia proxima, Guérin.—To obtain a feasible knowledge of the extent and direction of variability in this species, extensive material was procured by recrossing original broods and again their inbred progenies.

Some of the freshly-formed pupæ thus obtained were either subjected to treatment by excessive cold (−12° C. for two to three hours repeatedly), or kept at a temperature of about +4° C. for thirty days, while others were exposed to +38° C. for 100 hours. Gravid females were obtained from Morelos, Mex.; Los Angeles, Cal., and several more through the kindness of Dr. R. E. Kunzé, who took them at Phœnix, Ariz. The female from Morelos deposited only a limited number of eggs by October 26th, which hatched November 5th, producing the form *proxima*, Guérin, in December. The eggs from Los Angeles were obtained the latter part of April, the imagoes appeared the beginning of June, all the males being of the form *autholea*, Bdv.

The eggs of two females taken by Dr. Kunzé at electric light, commenced to hatch October 18th. The larvæ were fed during winter on *Cichorium endivia* and *Lactuca sativa*, var. *Romana* (Cos lettuce), this diet being varied sometimes by winter-spinach. The rearing of the progenies had, of course, to be accomplished at the regular temperature of a dwelling room.

The larvæ grew rapidly; November 16th the first pupæ were obtained, all others finishing their larval state by December 1st; the majority of moths appeared from December 3rd to 15th.

Three successive inbred generations were then reared. Another gravid female taken at Phœnix, April 18th, arrived at New York April 24th; the eggs hatched April 28th, and the final metamorphosis took place from June 4th to 15th.

*Parts I., II. and III. appeared in the Journal N. Y. Entom. Soc., Vol. X,

The course of development, as well as the general appearance of the imagoes of all broods were practically alike. In its life-history, the species differs somewhat from our eastern forms in moulting only five times, and all the individuals of a whole generation passing their transformations quite regular in about eight weeks, from the deposition of eggs to perfect insects. The last larval stage has a prolonged duration and the very restless larvæ at this period are inclined to attack and destroy each other. The very active and erotic males of this and other species of our N. A. Arctians manifest a decided inclination for uniformity of colour, gradually eliminating the probably original black to finally uniform white ; the conservative females apparently striving to retain and extend their dark colour. More constant forms like *virgo*, even show in the male sex a varying but decided paleness of the red colour of hind wings. In closely related European and Asiatic genera the wings of the sluggish, retrograde females are rudimentary. *(Ocnogyna; Tancrea pardalina; Rhyparia leopardina.)*

The tendency of the males to diffuse the light colour from the probably original sources—the veins*—and its transmission by the male parent seems to be constantly counteracted by the conservatism conveyed by the female parent. The vacillating, but still aimed variability of some of our more vital species, perhaps finds here its principal solution. In the much-disputed *nais* group, for instance, the females of the four distinct species (all probably originally deriving from *nais*, but now distinct) are recognized and separated from each other without the slightest difficulty, while the males, striving finally towards uniform and light coloration, are naturally bound to create resembling forms, merely by the two antagonistic principles inherited from the male and female parents. To consider these species as lingering in a *status nascens* might as well apply to all variable forms.

Stimulated by high temperature, it seems with the males of *proxima* that the black colour is gradually eliminated; the process generally begins with the area from 2nd to 4th transverse bands, which, widening in excess, leave (as far as the experiments reach) only two black irregular costal marks and a geminate dot at interior margin of middle area, besides traces of the black colour near base; the dorsal black maculation of abdomen is almost entirely superseded by red and the black of terminal

*Dr. Chr. Schrœder, Zeitschrift f. Entom., July, 1904, p. 257.

segment by sordid white. Extreme cold, as well as prolonged low temperature, with the males, seems to destroy or disintegrate the black of the scaling near inner angle of primaries, reducing it near apex more or less, leaving in extreme forms only a few costal spots and at base two broad black dashes; the hind wings losing besides the black marginal spots even the pinkish abdominal margin.

The females are far less inclined to yield in regard to colour and design to the stimulating influences of temperature. Heat mostly widens especially the transverse anterior band, and the deep red of the hind wings is changed to a much paler colour. Low temperature, namely excessive cold, also affects the inner angle of primaries as in the male, but in a far less radical manner; while at the middle and basal area the black predominates, replacing even the transverse bands; leaving only the white submedian stripe with a trace of median line. The hind wings also change to a paler colour and the maculation is reduced in size.

Among the immense number of individuals reared, not a single male was obtained with pinkish hind wings, or a female with yellow secondaries; though many specimens had the black maculation bordered by pale orange, as is often the case with other species of the genus. Melanic forms have a dusky shade cast over the white bands, often only the upper part of primaries to median vein is thus affected.

The weakened condition of the inbred generations made itself evident by an inclination to morbid diseases during the larval period and in general smaller size and less intense colours of the moths.

Arctia proxima may be at once distinguished from its nearest relation and neighbour, *Arctia incorrupta*, Hy. Edw. (Papilio I., p. 38*), by the total absence of the basal half-band in *proxima*; besides, the "median vein is narrowly and continuously lined with white scales" in the latter species (Neum. & Dyar, Revis. of Bombyces).

In size *proxima* varies not inconsiderably; the offspring reared from Los Angeles parents reaching 4.3 Cm. ♂ ♂, and 5.2 Cm. ♀ ♀; Morelos and Arizona progenies from 3.5 to 4.2 Cm. ♂ ♂, and 3.7 to 4.7 Cm. ♀ ♀.

Male and female *proxima* mostly remain in coitu for about twelve hours; one pair even being unfortunate enough to be unable to separate

*Probably by an error in proof-reading the text on page 39, Papilio, I., reads: "3 females, Prescott, Ariz.; 1 male, Dalles, Oregon." Henry Edwards had no females of this species. In his collection at the Museum of Nat. Hist., New York City, are 3 males from Prescott, Ariz., and 1 male from Dalles, Oregon.

again. With many of our eastern species *(virgo, phalerata*, etc.*)* the pairing generally takes less than an hour.

A sound fertilized female lives about seven days, disposing of about a thousand eggs at intervals, in loosely connected clusters or clumps of more than a hundred eggs each, rarely in patches; some liberated themselves of their whole stock of eggs in two large clumps; others again, as is often the case with *virgo* and *phalerata*, resting on the under side of a leaf and bending the abdomen downward, drop the eggs singly, occasionally changing the place; the eggs are dispersed considerably on account of their springiness.

The eggs of *proxima* are in appearance like those of almost all of our eastern species; rather bright, pale yellowish, more conical than rounded (blunt cones) and measure at base about 0.7 mm. Magnified they show essentially a like reticulation; the same is the case with the eggs of *Arctia incorrupta*, and as Mr. Gibson (Can. Ent., Vol. XXXII., p. 321) describes the eggs of *Arctia americana*, Harris, also as pale yellowish and semi-ovoid, it is interesting to compare the eggs of *Arctia caja*, L., from Europe, which are decidedly rounded and apple green; while those of *Arctia caja*, from beyond the Ural Mts., are described as pearly white (Berliner Ent. Zeitschr., Vol. XLIX., Aug., p. 36).

The mature larva forms a voluminous resting place, with little spinning, between moss or rubbish on the ground, changing after several days to a dark brown or pale pinkish-brown pupa, which soon becomes covered with bluish bloom; pupæ remaining without this bloom will not develop. The pupal rest extends from fifteen to twenty days; the females appearing first, mostly in the morning.

The wide range of *proxima* still seems to be limited to certain altitudes. In more southern regions the habitat of the moth may be extended to far higher elevations than, for instance, at Phœnix, Ariz., but it seems to avoid continuous severe cold.

All the females obtained from Dr. Kunzé and taken at Phœnix at an elevation of about 1100 ft. were *Arctia proxima*, Guérin, and with every generation derived from these there were always nearly one third *autholea*, Bdv., as well as all intermediate forms to the one with marginal row and discal dots of hind wings. At Prescott, Ariz., with an elevation of about 5400 ft., *proxima* seems to be replaced by *Arctia incorrupta*, Hy. Edw.

In "Entomologica Americana," Vol. I., p. 117, Dr. H. G. Dyar describes the preparatory stages of *Arctia proxima;* hence it would be useless to refer again to the larval stages of this species, did not the rearing in vast numbers reveal similar flexible and pliant endowments for the larvæ, as it did in regard to the imagoes.

The larvæ in their earliest stages change their original whitish ground-colour gradually to light yellow-brown or dull amber, and during their growth toward maturity, to dull or dusky orange and reddish-brown.

At third stage brown pigment accumulating at first patch-like, mostly near the bases of warts I. and II., forms a broad, brown subdorsal sphere or band, in which the two warts are situated. The dull, dark coffee-brown colour, spreading by degrees along the segmental folds to ventral region, increases in extent and deeper shade with the growth of the larvæ. After fourth moult (fifth stage) the larger, central part of segments from dorsum toward stigmatal line and often beyond it, appears deep velvety-black; the dull, greasy brown colour spreading subventrally from the segmental folds, sometimes at this stage overcomes the remaining orange ground colour entirely; mostly though reducing it to irregular, often confluent patches, above and below the bases of subventral warts, thus appearing as broken, irregular bands, even with the mature larvæ.

With their fifth moult the larvæ reach a length of 3.0 to 3.5 Cm., and feeding voraciously at this somewhat lengthened period, grow considerably, reaching at maturity a length from 4.0 to 5.0 Cm. This rapid growth naturally seems to cause a tension of the skin, and the dull, rather greasy, dark coffee-brown colour, before more confined to the segmental folds and subventral region, now prevails again and the velvety-black appears reduced to large quadrangular patches, from which warts I., II. and III. arise.

The dorsal stripe, rarely fully present with the mature larva, is generally retained on three first (thoracic) and two last (8th and 9th abdominal) segments as a fine, obscured whitish line. Fifth to ninth segments have each one irregular, white to brick-red spot, much obliterated, mostly on fourth and tenth segment. Individuals entirely free from dorsal line or spots are darker coloured even subventrally.

The warts of the mature larvæ vary from bright black to gray and glassy bluish-white; while subventral warts are even sometimes orange. The light coloured warts are covered with minute black dots, from which the bristles are emitted.

The bristles of wart III. turned upward are black, those turned downward foxy, or of the same variable reddish tint as all subventral ones. At third moult one single white bristle is emitted straightly from the centre of this wart, not quite as long as the few white ones on eleventh segment; at last stage this bristle appears more ochre and being weaker and more slender than the adjoining ones, it may often be broken by the rapid movements of the larvæ.

The stigmata, just after moult, are white with black slit, but gradually darkening in the vast majority of the larvæ to the variable brown colour of subventral region.

EXPLANATION OF PLATE 3.

1. ♂ imago, 14, xii., normal.
2. " " 4, xii., +38° C., for 100 hours.
3. " " 8, vi., " "
4. " " 8, vi., " "
5. " " 1, xii., " "
6. " " 10, xii., " "
7. " " 8, vi., " "
8. " " 8, vi., " "
9. " " 8, i., extreme cold.
10. " " 10, xii., +38° C., for 100 hours.
11. " " 30, xii., extreme cold.
12. " " 10, vii., continuous cold.
13. " " 12, vii., " "
14. " " 29, vi., extreme cold.
15. " " 12, iii., continuous cold.
16. " " 10, vii., " "
17. " " 10, iii., " "
18. " " 6, vi., normal, 4th generation.
19. ♀ " 3, xii., +38° C., for 100 hours.
20. " " 11, xii., normal.
21. " " 12, xii., normal.
22. " " 8, i., extreme cold.
23. " " 27, vi., " "
24. " " 19, vi., " "
25. " " 27, vi., " "
26. " " 6, vi., normal, 4th generation.

PRACTICAL AND POPULAR ENTOMOLOGY.—No. 3.

How do Insects Pass the Winter?

BY JAMES FLETCHER, OTTAWA.

There are few things in nature quite so remarkable as the hibernation of insects and animals in a torpid condition. That life should still persist when animationis reduced so low, as must necessarily be the case, with these small creatures in close contact with frozen substances or even imbedded in solid ice, would be quite incredible, were there not so many instances which can be examined by those who wish to do so, every day throughout our long and cold winters. In fact, it may be said that the intensity of cold has little or no effect upon insects which have prepared themselves naturally to pass through their long winter sleep, and the remarkable thing is that however low the thermometer may drop, if the insect is in a healthy condition, it never actually freezes in the sense of becoming hard and brittle. This, however, will take place if an insect be disturbed and taken from the place where it had prepared itself for winter, and such insects, if they do actually freeze, seldom or never revive. If they do, they are, as a rule, seriously or fatally crippled. The coverings made by some insects for their protection during the winter are sometimes surprisingly slight, but are sufficient for their needs.

Anyone wishing to investigate this interesting subject can find ample opportunity, for there is no time in the whole year when studies in the lives of insects may not be carried on, and,not only will this work be one of great fascination, but the exact knowledge as to the manner and stage in which any species passes the winter may be of great value in suggesting a method of preventing injury by a destructive crop enemy, or in protecting or even introducing from a distant country a beneficial parasite. In the north the long period of inactivity in which insects live through the winter is known as hibernation, and there is a corresponding season in southern arid regions known as æstivation, in which also animation is to a large measure suspended during the inhospitable season when all vegetation is also at rest owing to drought and lack of moisture. An insect may pass through these periods in any of its stages of development—as an egg, a larva, a pupa, or in the perfectly developed form. In almost every instance each species of insect has its own special habit in this respect. Full details of the life-histories, with the duration of the stages, is lacking with regard to many of our commonest and most destructive pests. This information, however, is of great importance and presents a very wide and

little traversed field of useful work, which is open to the veriest tyro in the study of insect life. In addition to this, many inaccurate statements have been made and ofttimes repeated as to the life habits of common injurious insects. Some of these errors have stood for years and have only been disclosed by more careful observations being made on all the stages, whether it was thought they were necessary or not. Instances of such faulty work may often be found in printed records of the time, place and method in which the eggs are laid, the condition and situation in which winter is passed and the duration of the various stages. Accuracy as to every one of these facts is of the greatest necessity when devising a practical remedy for those kinds of insects which do harm. A practical remedy is one which will do the work aimed at—*effectively*, so as to prevent damage to the crop; *easily*, so that people of ordinary intelligence can apply it without danger of mistake, and *cheaply*, so that the application of the remedy may not cost more than the value of the crop to be saved. The best remedy for a given crop pest must mainly depend upon how it will answer these three requirements, and the special work of the economic, or practical, entomologist is to devise the best remedy possible under varying circumstances. No remedy can be expected to give perfect immunity from loss, any more than the best remedy in the hands of a skilful medical practitioner can be expected to save every patient entrusted to his care. In both cases there are many contingent circumstances which may neutralize the effects of the best of remedies applied in the best known manner.

The foundation of all safe generalizations must rest upon as large a mass of proved facts as possible. In entomology, as in every other branch of knowledge, proved facts are wanting concerning very many common objects. I know of no more fertile field of useful work in the study of insects than that which deals with the life-history of any species in its home, including particularly its method of adjusting itself to its surroundings. Such facts as will be brought out in this work are now grouped together and spoken of as the ecology of a species. Ecology (or more properly Œcology, the word being derived from the Greek *oikos*, a home) is as yet a rather unfamiliar word, but is so complete and expressive that it must surely soon come into more general use. A consideration of the winter home of an insect and its manner of living there comes naturally under this head. Information on the subject should be sought for by careful personal observation, and to secure the best results each fact as learnt should be noted down at the time, for future correlation and

ultimately for comparison with observations made by others. Nothing not actually proved must ever be taken for granted. The true nature of things should be sought for, not the confirmation of theories. By working in this way every observation, however small it may seem to be, may be of value in completing a life-history or correcting an error.

As stated above, the possibilities for useful work are unlimited, and even the most inclement season of the year offers many opportunities.

At the present time much of Canada is covered with snow, and it may be fairly asked what kinds of insects could now be procured for carrying on these studies. As a reply, let us take a short excursion over the fields and swamps and through the woods. At Ottawa three feet of snow on the level renders snowshoes just now a necessity, but what an added charm is given by the exhilarating exercise thus provided. Starting with a congenial companion on one of the sunny crisp days which make up so large a proportion of our Canadian winter, supported on the light frame-work of the snowshoes and stimulated by their rattle and the crunch of the snow, let us pass easily over such obstacles as ravines, streams and rivers, now frozen and still, over barbed-wire fences muzzled by a blanket of snow, and let us make for the woods where, warm and sheltered from the coldest wind, we can carry on our search at ease. But let us first of all consider what we are likely to find. It is wonderful how many things will turn up when we go out with a set purpose of looking for them. Insects may be looked for in all stages and in almost any place. To one who has never collected in winter, it will be a great surprise to find how much may be done. Even among the butterflies, which are such favorites on account of their beauty and because so few are injurious, there are many gaps to be filled in as to the way they hibernate. We know a good deal about many species; but it must not be taken for granted that every species, even, in the same genus, will behave in exactly the same manner. Among those kinds of butterflies which may possibly be found in winter during our rambles are the different Vanessians, such as the Graptas, the two Tortoise-shells, the Painted Ladies and the Camberwell Beauty, which should be looked for snugly tucked away in the deepest recesses of some old hollow tree. In the same kind of places or under a fence rail the chrysalids of some of our Swallow-tail butterflies or of the Whites, and just possibly of a Thecla or Blue, may be found. Every clump of grass sticking above the snow, or bunch of dead leaves on bush or tree should be examined. Among the grasses or sedges the small larvæ of the Satyrids and of some Skippers pass the winter, and the difficulty of finding them will only stimulate to closer search. Some Skippers hibernate as pupæ and may be found beneath old

logs, chips of wood, or other objects, frequently covered with ice. In the crevices of the rough bark of trees many treasures may be looked for. The cocoons of such species as spin up on the trunks of trees are as a rule very difficult to distinguish from their surroundings because the caterpillars when spinning gnaw off from the surface many particles which they weave in with the silk, giving to the cocoon the exact appearance of the bark of the tree. The Acronyctas and Ceruras, or Kittens, spin cocoons of this nature. A dead leaf hanging on a hawthorn or apple tree may direct our attention to the egg cluster of a Tussock moth, to the larval case of the Apple Leaf-crumpler, Case-bearers or some other small moths. On the fruit spurs or smaller twigs will be seen easily the beautiful slender white cocoons of the Apple Bucculatrix, and, by closer search, the short brown pseudococoons of the half-grown larvæ of the Eye-spotted Bud-moth, or the similar true cocoons of *Nepticula pomivorella* may be detected. Much more conspicuous than these, cocoons of some of the large Saturnians or Emperor moths should be found on any afternoon's tramp through the woods or orchards in most parts of Eastern Canada. The larger number of the caterpillars, as a rule, spin up near the ground among grasses or other low growth, but good cocoons, as well as many which have been parasitized, may always be found high up in the trees or bushes. On maples, birches and other trees around the edges of woods the large irregular cocoons of Cecropia will catch the eye, as well as the smooth, oval cocoons of Polyphemus. On lilac bushes in gardens, or on ash trees, sometimes half a dozen at once, the hanging cocoons of Promethea may generally be easily obtained. Strange to say, all of these large cocoons may be more frequently found on shade trees in streets than in the woods. This is possibly owing to the females having been attracted to street lights in the vicinity and having laid their eggs on the trees.

In passing through an orchard, many eggs of moths, as well as of other insects, will reward the keen observer. The eggs of the Tent Caterpillar moths will show, when examined under a lens, that the tiny caterpillars were fully formed and able to move inside the egg-shells before the winter cold set in. If an egg cluster is taken into a warm room and the eggs then opened, the young caterpillars, when taken out, move awkwardly, like young kittens taken from their warm nest before their eyes are open. The eggs of the Cankerworms may also be found with the above, as well as those of many kinds of Aphids. Occasionally a patch of eggs of the predaceous bug, *Phymata Wolffii*, may be found on a bough. These somewhat resemble those of a moth, but each egg is bottle-shaped and they are gathered together in small clusters of about a dozen or fifteen

embedded in a coating something like that on the Tent Caterpillar eggs, but with the neck of each protruding through the covering. Several kinds of scale insects will probably turn up during our ramble; on apple and many other trees the Oyster-shell scale, Putnam scale, the Scurfy Bark scale, and some others of the armoured scales, will occur, also the young of some of the Lecaniums, or Soft Scales. These latter differ very much in habit from the armoured scales in that, instead of passing the winter as eggs beneath the old scales, the young insects hatch in summer and, as winter approaches, leave the foliage and crawl on to the young twigs, where they hibernate as minute flat brown scales resembling tiny turtles. When vegetation revives again in spring these small insects crawl about until they have found a suitable place, when they attach themselves to the bark and never again move.

A discoloured slight swelling in the side of a raspberry cane will give us a row of the eggs of the Snowy Tree-cricket, and if we split the same cane right down to the bottom we may find a fat caterpillar of the Raspberry Root Borer *(Bembecia marginata)*. Dead stems, seed pods and the flowering stems of perennials, should always be examined. By splitting dead stems, many small beetles, or the larvæ and pupæ of minute moths, will be disclosed. In the seed pods of mullein we may look for the caterpillars of *Penthina hebesana*, whilst almost every head of the burdock will give us ample supplies of the short, fat larvæ of the tiny imported moths, *Metzneria lapella*.

On the edges of swamps we may see a patch of bullrushes or cattails. In the seedheads we shall find the caterpillars of a tiny moth, and, by cutting open the stems, the large, olive-brown caterpillars of *Sphida obliquata* will be brought to light, as well also, perhaps, as some strange sculptured weevils of the genus *Sphenophorus* and the maggots of several, kinds of flies. Growing near these a matted web just coming through the snow may give us the winter tent of a colony of the orange and black caterpillars of the Baltimore Fritillary *(Melitæa phaëton)*. In the woods, tufts of moss or lichens growing on the sides of trees will well repay the trouble of detaching them and shaking them over a sheet of paper. The same may be done with moss from near the roots of trees, when an incredible number of small insects of nearly every order will be sifted out. Where swamp moss can be obtained, as along the edges of a running stream, this should be raked out and tied in small bags for taking home and examining at leisure. A convenient way is to tie up two or four small bags and hang them in a tree until frozen. They can then be slung

over the shoulders in pairs and can be carried without trouble or discomfort.

Even in the depth of winter many insects will be found moving at the bottom of open water, in streams, etc. Large water beetles and bugs are frequently dipped up by farmers through holes made in the ice for watering their cattle in winter. The curious case-bearing larvæ of Caddice flies can easily be secured by raking together the debris from the bottom of the water. In addition to our bags of frozen moss we should always take home with us some twigs and dead boughs from any dead trees we may notice. In these, when split and examined at home, we may get many kinds of bark beetles, or even a colony of the interesting Ambrosia beetles, or Shot-hole borers, the males and females all crowded so closely together in their burrows that it would be impossible to force another into the space. These interesting little creatures will richly reward anyone who will give them special study. It has only recently been discovered that they have a social life somewhat approaching in interest that of the social wasps, bees and ants, a tunnel being bored into a tree by the female for the purpose of rearing her young, not upon the wood of the tree, but upon special kinds of fungi which she cultivates there for her young brood.

In those more favoured localities where the ground is not covered with snow in winter there are, of course, many more opportunities for collecting than in colder districts with a heavy snowfall. The sifting of moss from swamps, from the sides of trees and of dead leaves from woods and along fences, will give an endless number of species of small beetles, flies, leaf hoppers, mites, spiders, etc. In looking for these, the material can be collected and carried home in bags for examination at any convenient time, when it should be sifted over a large sheet of paper with a good light and with several small bottles close at hand so as to catch the many specimens as they revive and begin to move. By using a large white pie-dish with a sloping edge some of the exceedingly active species will be prevented from escaping. It will be required that every sense be on the alert to secure all the material brought home even in a small bag. Every collection, for a long time at any rate, will give useful information concerning the life-histories of insects with which we were not fully acquainted. Anything which seems stranges, hould be noted down at the time. The specimens themselves should be sorted out and mounted at once. Those of interest to the collector should be put carefully away where they will not be injured by dust or museum pests, and all not required should be sent off at once to anyone else who is known to be interested in the various orders represented.

THE TONAL APPARATUS OF RANATRA QUADRIDENTATA, STAL.

BY J. R. DE LA TORRE BUENO, NEW YORK, N. Y.

In "The Canadian Entomologist" for August, 1903 (*), I called attention to the sounds produced by *Ranatra fusca*, Pal. B. Further study has shown me that the bug I then referred to was in reality *Ranatra quadridentata*, Stal., and that *R. fusca* is very rare in the north, if, indeed, it occurs at all, the former being the commonest species in the Eastern United States, the latter, on the other hand, being more southern. The notes referred to, therefore, apply to *R. quadridentata*, Stal.

Subsequent observation on a larger number of specimens has confirmed the exactness of my original observation, and I have found that adults as well as nymphs stridulate, and that the sound is produced under water as well as out of it. When in the water, however, the vibrations produce a louder chirp. Since the time this phenomenon was noted, I have consulted a number of papers on the sounds produced by the Heteroptera, but in none of them have I found any data bearing on the stridulation of Ranatra. Indeed, Mr. Kirkaldy, who is one of the most erudite Hemipterists and has a very perfect knowledge of the literature of this group, has brought to my attention that this is a heretofore unrecorded faculty in this water-bug.

The character of the sound and the insect's motions while producing it are substantially as previously described, except for unimportant individual variations.

Dissection has revealed the tonal apparatus. It consists essentially of two opposing rasps, one on the coxa near the base, with longitudinal striations, and the other on the inner surface of the cephalic margin of the lateral plate of the coxal cavity, which plate, by its thinness, must act somewhat in the nature of a sounding-board, intensifying the sound and imparting its vibrations to the surrounding medium. The position of the legs, somewhat obliquely held to the axis of the body, brings the coxal rasp against the coxal plate rasp, and the bug's jerky motions of the legs

*"Notes on the Stridulation and Habits of *Ranatra fusca*, Pal. B," Can. Ent., Vol. XXXV., pp. 235/7.

produce the rasping chirps previously described. The figure herewith shows the position of the first pair of legs in stridulating. (Fig. 5.)

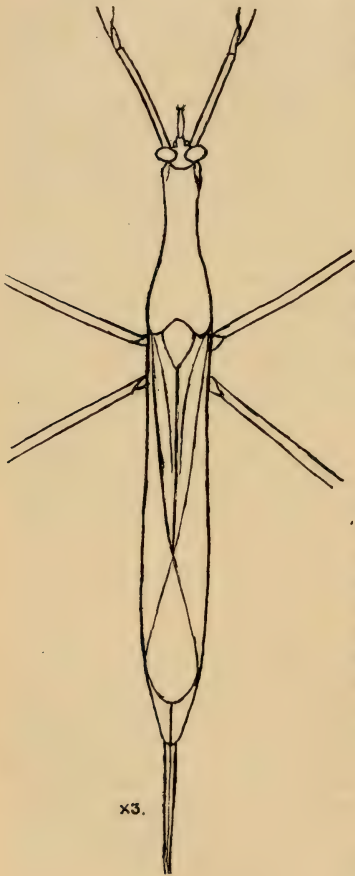


Fig. 5

The figures given are largely diagrammatic, for the purpose of bringing out the structural details of the tonal apparatus. Figure 6



Fig. 6.

shows the coxal plate from the side, and gives a good idea of its shape and proportional size. One side only of the prosterum is given in figure 7 to show the



Fig. 7.

slit-like elongated coxal cavity. As may be gathered from the two figures, this structure allows considerable vertical but limited lateral motion, and, in fact, Ranatra can lay the first pair of legs against the upper or lower side of the body with ease. The inner surface of the hollowed coxal plate is shown in figure 8,

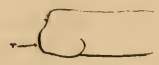


Fig. 8.

but only the mere shell, to show the position of the roughened

area. From these views, the thinness of this plate can readily be appreciated. The broader outline of the cephalic edge indicates the position of the coxal plate rasp, *r;* and figure 9 is the base of the coxa, showing in black the position of the roughened elevated area of the coxal rasp. The coxal rasp is a roundedly triangular callosity made up of irregular longitudinal lines, about .3 mm. long and .2 mm. wide (Fig. 10), and the coxal plate rasp consists of a series of parallel regular striations about .05 mm. long along its anterior edge for a distance of perhaps .8 mm. (Fig. 11).



Fig. 9



×35

Fig. 10.

×55

Fig. 11.

ARISTOTELIA YOUNGELLA—A CORRECTION.

The Gelechiid described by Mr. Wm. D. Kearfott in the January number of the CANADIAN ENTOMOLOGIST, page 15, as *Aristotelia Youngella* is *Enchrysa dissectella*, Zeller.

[Verh. Zool.-bot. Gesel., Wien., XXIII., p. 283. 1873.—Busck. Revision American Gelechiidæ, Proc. U. S. Nat. Mus., XXV., p. 919. 1903.—Dyar's List, No. 5677.]

It is well figured by Zeller on his plate IV., fig. 29.

AUGUST BUSCK, U. S. National Museum, Washington, D. C.

NOTE ON FOOD OF *ALABAMA ARGILLACEA.*

On October 19th, 1904, at Urbana, Illinois, during a week of high south-west gales, I observed a fresh, unrubbed moth at rest on a small tomato that had been placed on a bench in the sun to finish ripening, and in the process had cracked open. The haustellum was extended down deep into the juicy fruit and the moth gave every appearence of sucking the juice. No other individuals were noticed abroad at that time.

F. M. WEBSTER.

The Curator desires to acknowledge with grateful thanks the receipt of a large number of specimens, representing over a hundred species of Coleoptera, sent by Prof. H. F. Wickham, of Iowa City, to fill some of the gaps which he had noticed in the Society's collection when he took part in the proceedings of the last annual meeting.

Also a second contribution of a number of specimens of Lepidoptera and Cicindelidæ from Mr. Norman Criddle, of Aweme, Manitoba.

NOTE ON SIMAETHIS FABRICIANA, L.

BY ARTHUR GIBSON, CENTRAL EXPERIMENTAL FARM, OTTAWA.

For over three years we have had in the collection at Ottawa specimens of a pretty little Yponomeutid moth, which we have been unable to get identified.

Larvæ were first observed by the writer at Aylmer, Que., on May 24th, 1901. They were found feeding on stinging nettle (*Urtica gracilis*, Ait.), and appeared to be fairly abundant in one locality. Specimens collected on this date spun up within two or three days, and the moths emerged on June 7. These larvæ were noticed to have drawn the leaves together at the tips of the plants, and were living within the tents thus made. The cocoon is white and rather thickly woven. The pupa is slender and of a pale brown colour. After the moth has emerged, the empty pupa-case remains protruding conspicuously from the cocoon.

The following is a description of the larva: Length full-grown, 9 mm.; width at widest part, 1.5 mm. Head erect, bilobed, shiny, black, pale brownish towards clypeus, which is mostly pale and reaches almost to vertex; two or three pale spots are also present on each cheek. Body slender, dull yellowish, no markings on the skin. Thoracic shield black, divided in centre of dorsum. Tubercles black, shiny, large; lower lateral and ventral series smaller than i., ii., iii. and iv. Anal plate dark, mottled with black. Thoracic feet black; prolegs concolorous with venter.

During the past year Mr. C. H. Young also reared the species from larvæ found on the same food-plant, the moths emerging on the 4th, 8th and 10th June. Two of these bred specimens were sent to Mr. W. D. Kearfott, who identified them as *Simaëthis Fabriciana*, L. Writing under date of Oct. 26, Mr. Kearfott says: "This is a European species, never before recorded from this side of the water. The Ottawa specimens are 2 or 3 mm. larger than any of the European examples in my collection, but the fasciation and maculation seem to agree perfectly."

In a further letter, dated Nov. 28, Mr. Kearfott says with regard to this species:

"I see nothing else than to add this name to our lists. Dr. Dyar spent a night with me a couple of weeks ago. I showed him the two specimens and my European series, and he entirely agreed with my conclusions. The only difference is a slight increase in size."

March, 1905.

ASSINIBOIA MICRO-LEPIDOPTERA, COLLECTED BY MR. T. N. WILLING.

BY W. D. KEARFOTT, MONTCLAIR, N. J.

(Continued from page 48.)

Proteopteryx Willingana, Kearf.—Two additional specimens; Regina VII., 20. One strongly marked ♀ and one almost unicolorous ♂, the same as the types.

Ancyclis mediofasciana, Clem.—One specimen; Regina, VI., 18. Does not differ from Eastern examples; already recorded by Dyar from Kaslo.

Epinotia pseudotsugana, Kearf.—One specimen; Regina, VIII., 15. Not differing from my types. This species comes very close to *pinicolana*, Zell., differing principally in the front wings being of a dull leaden gray colour, while in *pinicolana* both ground colour and fasciæ are of bright brown shades. When describing this species I overlooked the palpi, the outer joint of which is entirely exposed, hence it should be placed in *Epinotia* and not *Cydia (Thiodia)*.

Cenopis reticulatana, Clem.—One specimen; Regina, VIII., 1. Less red than the Eastern examples in my collection. I am not aware of any previous record as far west as Regina.

Sparganothis puritana, Rob.; *vocaridorsana*, var. nov. Differing from *puritana*; in short central fascia, reaching only to middle of fore wing; entire absence of spot before outer margin, and in the costal spot doubled in width, covering costa from middle to apex.

Head, palpi and thorax yellow, much mixed with ferruginous, palpi paler on inner sides and above at base. Fore wing light yellow, paler than *puritana*. The spots and marks are a pinkish red, with a light purple tinge at some angles. A short basal dash of this color, below the costa and above the middle. A short fascia from costa at inner fourth obliquely to lower vein of cell, irregularly straight on its inner edge, the outer edge sharply and deeply indented by a spur of ground colour on upper half of cell. Costal spot begins at middle of costa and extends to, but does not involve apex, flatly triangular, its lowest point covering vein 7. A small discal spot. On dorsal margin are a few scattered reddish scales between outer third and anal angle, beginning with a tiny spot. Cilia tinged with pink. The costa from base to fascia is also narrowly edged with reddish. Hind wings evenly gray; cilia paler.

Under side fore wing: Yellow and ferruginous in a narrow band along costa, repeating the colours of the upper surface, below this dark

gray, cilia yellowish. Hind wings very pale gray, cilia a shade paler, preceded by a pale yellow line. Abdomen gray above; beneath, anal tuft and legs cinereous. Expanse 25 mm. Six ♂, Regina VI., 16; Aweme, VII., 10 (Norman Criddle) Winnipeg, (Hanham). Co-types, U.S. Nat. Mus., No. 8209, and my collection.

I have described this as a variety of *puritana*, but should not be surprised if it should prove to be a good species.

Archips cerasivorana, Fitch.—Three bred specimens, labelled "cherry web-worm," Medicine Hat, July. Not differing from specimens from the Middle and Western States.

Archips argyrospila, Walk.—One specimen; Calgary, VIII., 1. The dark form common to California.

Archips virescana, Clem.—One specimen; Regina, VIII., 13, very badly rubbed, but no doubt this species; common in the Eastern and Middle States, and also recorded from Arizona.

Archips persicana, Fitch.—Two specimens; Portage, VII., 10, and Regina, VII., 18. Darker than either Eastern Canada or British Columbia specimens, and with the white costal mark broader on the costa and more nearly resembling Zeller's figure of his *conigerana;* with a sufficient series showing this constant difference, I would be disposed to restore Zeller's name, at least to varietal rank.

Pandemis Canadana, sp. nov.—Fore wing very dark rusty brown, more or less overlaid with grayish-brown scales, with an oblique, purplish-black fascia from middle of costa to anal angle, a half-round spot of same colour on costa between fascia and apex, and an irregular basal band.

Head, palpi and thorax cinereous-gray sprinkled with darker specks. Antennæ cinereous. Fore wing rusty brown, overlaid with gray or grayish-brown, especially in basal patch and between it and central fascia. The dark scales in basal patch became more concentrated outwardly thus sharply defining the patch against the lighter ground colour which succeeds it; the outer edge begins at the inner quarter on costa, is slightly concave above and below median line, and convex outwardly on median line, widest on dorsal margin where it extends a third the length of wing and is shortly truncated. The central fascia is nearly straight, on its inner edge, from costa to middle, thence convex towards base for a quarter of its length, thence straight to dorsal margin, which it touches at two thirds; outer edge of this fascia concave on its upper quarter, thence nearly straight to anal angle; the lower, outer

half of this fascia more or less overlaid with ground colour and less sharply defined than inner edge and upper half. A broad, half-round spot on costa is the darkest of all the marks on costa. It covers between one-fifth and one-fourth the length of wing and leaves an equal division of ground colour on each side, between fascia and spot and spot and apex. On the costa are a number of short, hardly oblique, dark dashes; four or five in basal patch, two in ground colour succeeding it, three in fascia and two or three in ground colour beyond. A broken line of dark scales before outer margin. The fascia and spot are outlined by a lighter brownish-ochreous line. In one specimen the dark colour replaces the brown entirely, the spot and fascia being indicated only by the paler border lines. Cilia ground colour, preceded by a narrow dark line, the tips paler ochreous-brown. Hind wing and abdomen very dark fuscous, paler above cell, cilia pale fuscous. Legs cinereous, first and second pair clouded with gray-brown in front. Expanse, ♂, 19 to 21 mm.

♀ marked same as ♂, but all marks nearly obsolete and indicated more by the darker outer lines than their internal colour. Expanse, ♀, 24.5 mm.

Eight ♂ ♂, Regina, VIII., 13 to 15; St. Albert, VII., 20; Aweme, VII., 31, to VIII., 15, (Norman Criddle.) One ♀, Regina. Co-types, U. S Nat. Mus., No. 8208, Mr. Willing's and my collection.

I at first identified these specimens as an unusually dark form of *Pandemis limitata*, Rob., but the outline of the basal patch and central fascia are quite different and are sufficient to warrant separation, even if there were not such a considerable difference in the colour. The outer line of the basal patch ranges from nearly straight to slightly indented below the middle in *limitata*, while in *Canadana* this line is deeply scalloped above and below the middle. In *limitata*, the inner edge of central fascia is straight, with, in some specimens, a small tooth projecting at a third below costa, while in *Canadana*, this line bulges out widely below the middle. The fascia of ground colour between basal patch and central fascia is much narrower in *limitata*, with sides nearly straight.

Tortrix Alleniana, Fern.—Four ♂, Regina, VIII., 13 and 15; Macleod, VII., 2; two ♀, Lethbridge, VII., 11; one ♂, bred, Medicine Hat, larva on poplar, V., 30; pupated VI., 7; issued VI. 20. Prof. Fernald has kindly loaned me two ♂ and one ♀ types of this species, and while the ♀ ♀ cannot be separated and compare exactly, the ♂ ♂ have necessitated a very considerable amount of study, and I should not be surprised if additional material from points between Regina and

Maine would prove the existence of two good species, especially if a ♀ form should be found constantly different from the ♀ of *Alleniana*.

The fore wings of the ♂ types of Alleniana are yellowish-brown, very finely and lightly reticulated with a darker shade of brown, an oblique fascia from centre of costa in one specimen extends barely to cell, and in the other is obsolete; on costa before apex is a faint indication of a spot. The hind wings are immaculate, of a very light buff shade. Several of the Regina ♂ ♂ compare closely with the types, except that the central fascia is strongly developed, continuing down to and disappearing just above the anal angle, while the pre-apical spot is large and dark, and has a tendency to run into a curved sub-marginal darker shade that involves the outer margin. The balance of the ♂ specimens have distinctly grayish-brown fore wings, with reticulations, fascia and marks the same; but the hind wings are fuscous, with the pale straw colour costal and apical borders finely reticulated. I think it quite likely that this is the species referred to in a letter from Dr. Fletcher (VII., 15, 1904) that is suspected of doing considerable damage to the *Populus tremuloides* of the Northwest. I should like to have given the name *populana* to this species, but find it impossible to separate from *Alleniana* with the material before me.

Tortrix symphoricarpana, sp. nov.— ♂, 27 mm. Head and palpi grayish-tawny-brown, outer ends of scales and outer joint of palpi dark slaty brown; thorax and front wing tawny-brown or grayish-yellow. An oblique, blackish-purple fascia from middle of costa to hind margin before anal angle, narrowest on costa; indented and partly interrupted on upper median vein, inner edge well defined, nearly straight but swelling out slightly in cell, with two very slight indentations, one at middle of cell and one on median vein, slightly concave below cell; outer edge of fascia less distinctly defined, the dark colour becoming paler and approximating the ground colour; indented between costa and upper median vein, below latter convex to before anal angle. A duplicate spot on costa half way between fascia and apex, somewhat triangular but rounded on inner edge, and is twice as wide on costa as fascial spot on costa, most intense on inner edge; from lowest point of spot is a dark, outwardly curved, much broken line to anal angle; several short, vertical reticulations between this line and outer margin, crossed by horizontal reticulations. The balance of the wing is coarsely reticulated vertically, in the type there being seven points touching the costa between base and fascia and three between fascia and costal spot. Cilia tawny-yellow. Hind wing pale cinereous, clouded basally and dorsally with fuscous, and apically

with ochreous. Cilia paler. Under side front wing light tawny brown below costa and before outer margin ; central part of wing from base to end of cell, dark, brownish fuscous. The reticulations of upper side are duplicated on costa and outer margin, with three well-defined short costal streaks beneath the inner and outer edge of fascia and inner edge of costal spot. Abdomen grayish-brown, tuft ochreous, legs pale ochreous.

♀, 25 mm. Marked generally same as ♂, but ground colour is darker brown, causing the fascia and spot to be less distinctly defined; the reticulations are also more obscure, except between the submarginal line and outer margin they are more distinct and form a submarginal dark shade. Hind wings slightly paler. One ♂. Two ♀. Medicine Hat, VII., 21, from larvæ on Snowberry, *Symphoricarpa*, sp. Co-types U. S. Nat. Mus., No. 8207, and my collection.

The maculation of this species is very much like Robinson's figure of *Archips zapulata*, except that the dark basal area shown on the figure is entirely absent. It is also very much darker than *zapulata*, and as the ♂ has no costal fold, it cannot even be referred to the same genus.

Tortrix pallorana, Rob.—Twelve specimens, Lethbridge, VII., 11, Regina, VII., 10, to IX., 2. ♂'s average 25 mm ; ♀ 30 mm. I have so far found it impossible to satisfactorily separate Robinson's two species, *pallorana* and *lata*. Mr. Willing's specimens agree in size with *lata*, but in colour and shape they are nearer *pallorana*, although they do not exactly agree in any one particular with either, except that the fore wings are immaculate. We may have a new species, but I should hesitate describing it without very much more complete data of the larval stages. *Pallorana* is on record as bred from *Verbena* and *Cerasus*.

Tortrix albicomana, Clem.—One specimen, Lethbridge, VII., 11; The canary-yellow form, rather heavily overlaid with pale purple scales, concentrated in two half fasciæ from costa and a whole fascia before the cilia on the outer margin. It is the intermediate form, between the type, which is the palest canary-yellow, and the other extreme, where the whole fore wing is overlaid with deep lustrous purple, excepting a short basal yellow patch, continuing in a line along the costa and running into the outer marginal yellow fascia. I have recently separated this form, calling it var. *semipurpurana*. This Regina specimen is of the form commonly bred on Rose, and which has usually been mistaken for *bergmanniana*, Linn. I have considerable doubt that the latter really occurs in America.

MOSQUITO NOTES.—No. 3.

BY C. S. LUDLOW, M. SC.,
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In a very interesting collection of mosquitoes lately sent me from the Philippine Islands by Dr. Eugene R. Whitmore, 1st Lt. Asst. Surg. U. S. A., occur a couple of forms which seem entitled to position as new genera, and some others of merely specific interest. The new genera are separated, in the first instance by a combination of values that makes it seem secure, while in the second case it lies between Finlaya and Macleaya, and the differences are not so marked.

Reedomyia, nov. gen.—Head covered with slender curved scales, forked scales on the occiput, and flat lateral ones, as in Culex; palpi two jointed in the female; thorax clothed with curved scales; scutellum with broad flat scales only; metanotum nude; fork cells of wing short.

The genus is named after Major Walter Reed, Surgeon U. S. A., whose invaluable work in proving *Stegomyia fasciata*, Fab., the intermediate host in the transmission of "yellow fever" is too well known to need more than mention.

Reedomyia Pampangensis, n. sp.—♀. Head densely covered with slender curved scales and flat lateral ones; a brown triangular (base caudad) median spot bordered by a white stripe, followed laterally by brown scales and then by lateral white flat scales, no tuft of scales between the eyes, but many bristles around the eyes, and a border of curved light-yellow scales around the eyes, fork scales numerous and extending well up on the vertex; antennæ brown, verticels and pubescence brown, basal joint light brown and partly brown scaled, first joint has a few brown scales; palpi brown, somewhat constricted at base of ultimate joint; proboscis brown dorsally, and fawn coloured ventrally to about three-quarters its length, apical quarter dark, tip brown; eyes brown; clypeus brown.

Thorax when viewed directly from above is of general reddish brown colour and darker in other lights; prothoracic lobes testaceous with white slender curved scales and dark brown bristles. In these specimens, as in some others lately received, these lobes appear to be stalked, the stalks running in a curve up the cephalic aspect of the thorax, and the "lobes" on the dorsal end as a cap, reminding one somewhat of a "mushroom." Mesonotum is a light reddish brown with light yellow and dark brown slender curved scales rather indefinitely arranged—an indefinite white

band across the cephalic end—a narrow indefinite light lateral band extending half way to wing joint, and a small spot dorsad of the end of this line, but the markings are very indefinite, general effect being a reddish brown, sparsely covered with an irregular arrangement of dark and yellowish scales. A heavy bunch of dark brown bristles near the wing joint, and a short line of very long and heavy dark brown bristles on either side of the "bare spot." Scutellum light brown, all three lobes densely covered with broad flat white scales; six large bristles on mid-lobe and several smaller ones also ; metanotum brown, bare. The brilliant white scutellum is very effective and marks the insect at once.

Abdomen light, covered with brown flat scales and many golden apical hairs, with now and then a suggestion of narrow white basal bands, and with distinct white basal lateral spots. Venter partly white scaled, but with brown apical bands.

Legs, coxæ and trochanters light, white scaled ; hind femora light at the base, otherwise all the femora brown scaled dorsally—creamy scaled on the ventral side ; a brilliant white apical spot; all the tarsal joints brown. The legs are rather prominently light bristled throughout, which even suggests, with the hand lens, light spots on the hind tibiæ. Fore ungues large, equal and uniserrate.

Wings clear yellowish, covered with dark brown scales, except a small spot at the very base of the costa, which is brilliant white. Cells short; scales rather broad and truncate, costal edge shows some tendency to the spinous scales found in *Uranotaenia*. First submarginal is about a sixth longer and the same width as the 2nd posterior, the stems of each about the same length and about two-thirds as long as the cells ; mid and supernumerary cross-veins meet and are nearly equal, posterior cross-vein is a trifle shorter and distant twice its own length from the mid. Halteres light, with dark knob.

Length, 4–5 mm.

Habitat.— Angeles, Pampanga, Luzon, P.I. Taken in Sept.

Described from three specimens sent by Dr. Eugene R. Whitmore, 1st Lt. Asst. Surg. U.S.A., marked "Caught in the woods and in the Quarters."

Popea, nov. gen.—Head covered with flat, forked, and slender curved scales, the latter occurring *only* on the median line; palpi long in the male; thorax with slender curved scales; scutellum with median scales on each lobe flat, and slender curved scales between the lobes and

forming an apical border to all the lobes. Abdomen normal in shape, bearing ventral medium tufts of long clavate scales. Wing cells short, and the scales suggesting *Taeniorhynchus;* ungues uniserrate in the male. This evidently lies between *Finlaya*, Theob., and *Macleaya*, Theob.

The genus is named in honour of Lt.-Col. B. F. Pope, Deputy Surg. Gen. U.S.A., under whose authority, as Chief Surgeon Division of the P. I., this investigation was originally begun in connection with the work of the Board of Health, Manila.

Popea lutea, n. sp.—♂. Head covered on median line with curved white scales, the remainder of the head with flat and a few forked scales, a narrow stripe of yellow flat scales next to the median line of curved ones, then a broader stripe of brown flat scales, followed by white flat scales; brown and yellow forked scales on the occiput, white ones near the vertex, a few light hairs projecting forward; antennæ plumose, light brown, light bands on each joint, a few dark flat scales on the first joint, basal joint brown, a few white flat scales on the median side; palpi light, long and slender, irregularly mottled with yellow, white and brown scales, the tuft is small and light coloured, tip dark; proboscis rather heavily scaled, mottled yellow and brown, the basal part brown, followed very irregularly by deep ochraceous yellow, so that it amounts to a broad irregularly shaped band, the apex narrowly brown, (tip missing); eyes brown; clypeus brown.

Thorax brown, prothoracic lobes brown scaled, with yellow and white flat scales; mesonotum brown, covered with yellow, white and brown curved scales arranged in indefinite groups, yellow, flat scales at the nape; pleura dark brown, with patches of white clavate flat scales; scutellum testaceous, the median portion of each lobe with flat, the interlobular parts and caudal edge with rather closely placed slender curved scales; the flat scales on the median lobe are brown, with a line of yellow at each side, those on the lateral lobes are brown, the curved scales are light sulphur yellow, fine bristles on median lobe; metanotum brown, bare.

Abdomen light, covered with dark brown and yellow scales, mostly yellow; a broken median line of dark brown irregularly-placed spots—*i. e.*, sometimes apical, sometimes basal—extends the whole length of the abdomen, and the ultimate segment has an apical brown band, the broad lateral yellow stripe is occasionally broken by a few brown scales, but the effect is distinctly yellow: yellow apical, lateral and ventral hairs; venter yellow, white and brown, there are well-marked tufts of long

brown scales on the median line of the venter on most of the segments, but on the ultimate segment the tuft is yellow. These scales are clavate, and not denticulate. A few white scales appear in connection with the lateral (yellow) stripes and the dorsal basal white band on the ultimate segment is largely of white scales. The claspers are large and there is a fan-shaped tuft of long yellow spatulate scales just beside them on the ventral side.

Legs all mottled; coxæ and trochanters testaceous with white and brown scales, femora irregularly spotted with brown and white scales, a few yellow ones also occur; tibiæ much lighter, and mostly yellow scaled, a few brown scales in small bunches giving the mottled look; tarsal joints mostly yellow scaled, on the hind legs there are tiny basal brown spots; in the fore and mid legs the brown scales are somewhat lighter and have no definite arrangement, but the last tarsal on the fore legs are mostly covered with these lighter brown scales. Ungues slightly unequal, both uniserrate, hind ungues equal and simple.

Wings very light and delicate and of slightly yellowish cast, covered with broad yellow and brown median and lateral scales, suggesting *Taeniorhynchus* scales; the ventral scales are, however, slender. The wing is apparently partly denuded, but the apex is light, and there is a well-marked yellow costal spot near the junction of sub-costa and extending on the wing field to the 3rd longitudinal in the vicinity of the cross-veins; there is a smaller yellow spot on the costa interior to this, and the costa is light continuously from the base of the wing nearly one third its length; the fork cells are small, nearly as small as those of *Uranotaenia*, and the costa has spinous scales as in that genus; 1st submarginal is a little longer and a little narrower than 2nd posterior. Mid and supernumerary cross-veins meet and are about equal in length, posterior cross-vein is about same length as the others and distant from the mid nearly twice its own length, interior. Basal cell is very long. Halteres light, knob mostly yellow scaled.

Length, 5.5 mm.

Habitat.—Camp Stotzenberg, Angeles Pampanga, Luzon, P. I. Taken Sept.

Described from one very perfect specimen sent by 1st Lt. Eugene R. Whitmore, Asst. Sug. U.S.A., with the legend, "Caught in the woods and banana trees."

This is a very beautiful sulphur yellow and brown species, and the peculiar scaling of the scutellum, the short fork cells, broad wing scales and abdominal tufts assign it at once to its place between *Finlaya* and *Macleaya*.

Taeniorhynchus argenteus, n. sp.—♀. Head dark brown, almost black, covered with white curved scales, white and light ochraceous fork scales, and a few brown mixed with the white flat lateral scales, small white curved scales between the eyes, and a few dark brown bristles around the eyes; antennæ brown, verticels dark brown, pubescence white, basal joint testaceous; palpi dark brown with a few white scales at the tip; proboscis dark brown, with ochraceous band at basal part of apical half; clypeus dark brown; eyes brown and gold.

Thorax: prothoracic lobes brown, with white curved scales, and a few brown bristles; mesonotum dark brown, almost black, covered with white curved scales, except two ante-scutellar sub-median brown bar-like spots projecting forward from the scutellum about one third the length of the mesonotum, and two very small round brown spots nearer the cephalic end; there are also a few light bristles, but not making distinctly marked lines. Scutellum dark brown, with white curved scales, and brown bristles, six on edge of median lobe, four on each of the lateral lobes; pleura dark brown, with small bunches of white flat scales; metanotum dark brown.

Abdomen dark brown, narrow basal light (slightly ochraceous) bands, occasionally a few apical light scales, small basal white lateral spots on some of the segments; ventrally mostly light scaled.

Legs, coxæ and trochanters dark brown and white scales; all the femora dark brown, with a sprinkling of white scales, so as to make them quite speckled, ventrally lighter, and on the mid and fore legs mostly light scaled; tibiæ of mid legs markedly speckled, the others darker; metatarsus brown on all the legs; with small basal light bands, and the other tarsal joints are also brown and have small basal light spots, sometimes developed into bands, except the ultimate joint of the hind legs, which is dark throughout. Sometimes these spots or bands are very faint. Ungues simple and equal.

Wings clear, rather heavily brown-scaled, especially in the apical half; the median scales heavy, clavate, somewhat truncate, the lateral scales spatulate, and the ventral scales slender; the ventral scaling is unusually heavy. Fork cells short; the 1st submarginal somewhat

shorter and narrower than the 2nd posterior; supernumerary cross-vein slightly shorter than the mid, which it meets; posterior equal to mid and distant twice its own length. Halteres light. Length, 4–4.5 mm.

Habitat.—Angeles Pampanga, Luzon, P. I. Taken Sept. ? ———.

Described from several specimens sent by Dr. Whitmore.

A well-marked *Taeniorhynchus*, and the white scaled head and thorax and speckled femora make it easily differentiated from the other species, though at first glance it suggests *T. tenax*, Theob.

Stegomyia Gardnerii, n. sp.— ♀. Head densely covered with broad flat brown and white scales. A very broad median white stripe from occiput to vertex, with a dark brown somewhat triangular brown spot on either side, bordered by white and followed laterally by a brown and then a white stripe; a few bristles around the eyes, projecting forward, two bristles between the eyes; very few or no fork scales; antennæ dark brown, verticels and pubescence dark brown, basal joint dark brown, heavily covered with flat white scales; palpi dark brown with brilliant white tip; proboscis brown; eyes brown, and a white rim around them made of smaller, perhaps spindle-shaped, but not true curved scales.

Thorax: Prothoracic lobes brown, with white flat scales; mesonotum brown covered densely on the median portion, so as to occupy about one third the width of the mesonotum, with dark brown spindle-shaped scales (bronze iridescence), a few curved white scales on the cephalic edge, and laterad, a broad white stripe extending about one half the length of the mesonotum, brown scales exterior to this; a large white spot in front of the wing joint; the caudad half of the mesonotum is dark brown, with a short median line of fine white or yellowish scales, and a short indefinite line on each side, just in front of the scutellum, and here the scales become very long, curved and spatulate flat scales, so they fringe out over the scutellum. Scutellum brown, covered with long spatulate flat scales; brown scaled at the base, with a broad white border on the apical edge; pleura brown, with heavy bunches of white scales; metanotum brown.

Abdomen heavily covered with rather large flat brown iridescent scales, white basal lateral spots of varying sizes on most of the segments and four white dorsal basal spots—one on the penultimate—is lacking on the antepenultimate, and present on the three segments cephalad to this. Ventrally there are heavy white basal spots, so that the venter is at least half white scaled.

Legs: Coxæ and trochanters light brown, white scaled; fore femora white scaled ventrally, otherwise dark brown, iridescent scales; metatarsi brown, with very small basal white spot; first tarsal joint brown with small basal white spot; second, third and fourth joints brown; ungues small, equal and uniserrate; mid-femora dark brown with a few white scales at the base, a small white spot midway on the cephalic aspect, and a white spot near the apex, which under the hand lens looks like a knee spot, but the very apex is brown; tibiæ brown; metatarsi brown, with a small basal white spot, a little larger than those on the fore legs; first tarsal joint with small basal white spot, other joints brown; hind femora white scaled ventrally and dorsally, except a large brown dorsal spot near the apex, which, however, leaves the apex white; tibiæ brown; metatarsi brown, with basal white spot; all the tarsal joints brown, with large basal white spots so wide as almost to include the whole joint on the distal joints, but not always marked on the ventral side.

Wings clear, with brown scales, the median scales large, broadly truncate, and the lateral, which are about twice as long, are comparatively slender, and also truncate; the ventral scales more slender; first submarginal cell is about one-third longer than and the same width as the second posterior; supernumerary cross-vein equals the mid, which it meets, and the posterior cross-vein is a little longer than the mid and about twice its own length distant; halteres have light stem and dark knob.

Length, about 5 mm.

♂.—In general the male differs little from the female; palpi slender, longer than the proboscis, brown, a small white spot at the base of ultimate, a slightly larger one at base of penultimate, a band at base of the ante-penultimate joints, and another white spot nearly as wide as the band, near the base: palpi not tufted. Ungues unequal, the larger uniserrate, the smaller simple.

Length, 3.5 mm.

Habitat—Bulacao, Mindora Is., and Angeles, Pampanga, Luzon Is., P. I. Taken Aug. 20, (Bulacao), Dr. Gardner. Sept. ?, (Angeles), Dr. Whitmore.

Described from specimens sent by Dr. Fletcher Gardner, Cont. Surg. U. S. A., taken at Bulacao.

From Camp Gregg, Bayambang, in the large and interesting collection from Capt. W. P. Chamberlain, referred to above, comes another new mosquito whose wing scales, occurring in connection with flat scutellar

scales, and its extremely short female palpi, are distinctive. As I have only one specimen, I have not been able to demonstrate the exact number of joints, but they must of necessity be few.

O'REILLIA, nov. gen.

Head clothed with curved, forked, and flat scales, much as in *Culex*; scutellar scales flat; wing scales usually symmetrical, very broadly truncate, and notched; palpi extremely short in the female.

The genus is named after Gen'l Robert M. O'Reilly, Surgeon-General, U.S.A., whose broad interest in all scientific study in any way connected with Medical work has made possible many researches, and among them the continuance of this mosquito work.

O'Reillia Luzonensis, n. sp.— ♀. Head dark, covered with light (almost white) curved scales, very broad forked scales having markedly fimbriate (under ♀ ♂ in objective denticulate) tops, which in some lights are white; a couple of bristles between the eyes; white rim around the eyes; white flat lateral scales; antennæ dark, verticels and pubescence light, basal joint testaceous with a few small, white, flat scales; palpi extremely small, dark, with a few white scales at the tip; proboscis mostly yellow scaled, the base, and a very narrow rim at the apex being dark brown; clypeus brown; eyes brown.

Thorax brown; prothoracic lobes with flat, somewhat spindle-shaped white scales; pleura testaceous; scutellum brown, with brown and white, rather long, flat scales on the mid-lobe, lateral lobes with white flat scales; metanotum brown.

Abdomen light, covered with dark brown and orange-yellow flat and somewhat spatulate scales, irregularly placed so as to be "speckled"; venter rather lighter than dorsum, but "specked"; light apical hairs.

Legs all light; all coxæ and trochanters covered with brown and yellow scales; all femora and tibiæ speckled yellow and brown and are darker than the rest of the legs, ventral side lighter; fore tibiæ are dark, the metatarsi and tarsal joints light with faint brown spots; mid-tibiæ are dark near apex and the metatarsi and tarsal joints are all light, with faint light brown spots on some of the joints; the hind tibiæ are dark near apex, metatarsi light, and the tarsal joints brown; *i.e.*, light brown, with light basal bands on the first, second and third joints, the fourth joint covered entirely with the light brown scales. Ungues simple and equal.

Wings clear, covered with brown and white (or light yellow), broad scales, the apical ends truncate and notched; the ventral scales obovate

or clavate and very thin and white. There seems to be no arrangement into spots, the wing being simply "speckled." 1st submarginal cell is nearly twice as long and a little narrower than the 2nd posterior cell, its stem being about one-half the length of that of the posterior; mid and supernumerary cross-veins are about equal and meet, the posterior cross-vein nearly twice as long, and a little more than its own length distant. On the costal edge the scales show something of the spinous shapes found in *Uranotaenia*. Halteres light.

Length 3.5–4 mm.

Habitat —Bayambang, Pangasinan, Luzon, P. I.

Taken Sept. 11, "Outside screens of screened house. Rainy night."

Described from one very perfect specimen sent by Capt. Chamberlain, from Camp Gregg.

The wing scales are as broad in this genus as those usually found in *Mansonia*, the large notch or indentation at the apex being easily recognizable, and in connection with the flat scales on the scutellum are distinctive. No metallic scales occur on the insect.

(To be continued).

COLLECTING MOTHS IN THE AUTUMN AND WINTER.

BY HENRY ENGEL, PITTSBURGH, PA.

During October and November, 1904, I had the pleasure of learning some interesting features of the habits of a certain group of moths which appear at that season of the year. The abundance of these species under seemingly very unfavourable climatic conditions was a great surprise to me. The observations made on these hardy creatures of the insect tribe may prove interesting to Lepidopterists who are willing to exert a bit of energy in the pursuit of their hobby. During the last few years I have learned that we must take the topography of the country into account in selecting a place to bait for the moths, which appear after we have observed the first autumn frosts on the landscape. I will, therefore, briefly describe the vicinity of my collecting grounds. My home is situated in a ravine, back of the hills south of Pittsburgh, Pa. The difference in the altitude of the valley and the hilltops is about five hundred feet. On the slopes near my house are about twenty-five acres of woods, consisting chiefly of oak, ash, maple, a few hickory, elm, locust trees and very little underbrush. Beyond this woods are pasture fields and farm lands, the fences of which are lined with wild cherry trees.

For several seasons I have endeavoured to obtain some of the late-flying moths by sugaring, but met with indifferent success. The evenings at this season of the year are nearly always cold, especially in the dales of our undulating country. Therefore, the much-desired *Scopelosoma*, *Xylina* and other more or less rare species did not accumulate very fast in my cabinet. About the middle of October, when the nights became too cold for collecting at light, my season was practically ended. If we peruse the various local lists of Lepidoptera published in our periodicals, we are impressed with the fact that the collecting carried on is, with a few exceptions, rather superfiical, and that little or no efforts are made to obtain the very early and the late appearing kinds. The interested student always finds a source of knowledge in looking over the collections of his colleagues. We observe material collected by certain methods and during periods which we have hitherto neglected. The various species which appear very early in the spring have been found quite successfully by the local collectors. My friend, Mr. Fred Marloff, some years ago initiated the sugaring method in this section for the late-occurring kinds. His home is about one mile farther south from Pittsburgh than mine, on top of a hill. Mr. Marloff continued sugaring until late in November, and was quite successful in getting material. The bait consisted of rotten apples and pears rubbed on the trees in his orchard. Overripe, mushy apples are by far the best material for luring moths that has come to my knowledge, and there is only one objection, they discolor the hands of the operator. This may be avoided by wearing a pair of rubber gloves.

On October 2nd, I spent the day with Mr. Marloff and was informed of the capture of *Xylina Bethunei* the previous week. The first visit to the baited trees that evening resulted in the capture of *Xylina pexata* and *signosa*, one *Glæa sericea* and a number of common species. So here was the beginning of the harvest, and I concluded to try the hill near my home. On the following day the consent of a farmer was obtained to take all the rotten apples I wanted if they were of any use to me. A bushel was taken home, and more subsequently as I needed them. Commencing with the fence posts in my lot, each one of which received a patch of crushed apples, I extended my line along a path in the woods for about 200 yards to the pasture field. Then along the edge of the woods for a quarter of a mile on a row of trees at right angles from the woods to the highest part of the hill, about 150 yards, then along a dividing fence down hill towards the starting point. All the conveniently situated trees and every third fence

post along this route were baited. After the first few applications a crust is formed and only a little refreshening need be applied every evening. On days when the atmosphere is damp the moths will be strongly attracted without any additional applications. The lure should be put on a little before dusk, as the moths start flying quite early in the evening.

To give a fair idea of what is missed by neglecting the opportunities of late collecting, I have appended a list of the species taken by Mr. Marloff and myself during the last fall and winter. The kinds which occurred in one locality only are followed by the name of the collector. A little discourse, however, on several remarkable evenings experienced, seems appropriate and may lead others to experiment when similar conditions of weather prevail.

On October 4th and 5th we had rather warm and sunny days. Shortly after starting on my luring expedition on the latter date a thunderstorm suddenly came up. A lively shower freshened things up and a drizzling rain continued for about an hour. When the rain commenced I started on the homeward journey, somewhat disappointed at the interference with an evening's recreation. Happily the reverse proved to be the case, for I learned that evening how congenial a damp atmosphere is to the moths. The black clouds caused darkness to settle quickly. Induced by this, and, no doubt, by the moisture in the air, which appears to give a greater range to the aroma of the lure, the moths were noticed to appear so abundantly on the baited trees that I resolved to stay and see the affair through. Nearly one hundred specimens were collected, including some good species. Of the commoner kinds hundreds might have been taken, but only the desirable varieties were selected.

Collecting was continued every evening with variable success; a capture of one or two moths some evenings new to my list making the matter interesting until October 17th. On the following three days very warm weather prevailed and some good material was taken. I collected every evening on these days until about 10.30 p. m., when I was quite tired of travelling up and down the hill. Early on the morning of October 21st a good rain fell and after a cloudy and windy day the temperature was quite cool towards evening. At 5 p. m. rain again set in, accompanied by high wind. Recollecting my experience on the other rainy evening I ventured outdoors about dusk to take a peep at the baited fence posts. The weather was abominable, but on every post were nice newly-emerged examples of *Scopelosoma*. These

were quickly bottled, and putting three cyanide jars in my pockets I went on a journey up the slippery hill. Moths were plentiful on every baited post and tree. *Orthosia bicolorago* predominated everywhere. On warm, wind-still evenings the trees must be approached cautiously, as these common loafers will quickly take wing and disturb what more desirable species may be there. On the evening in question, however, every moth held on for dear life, with its wings fluttering in the breeze. The desirable species were readily selected, but the *Scopelosoma* and *Xylina* have the very vexing habit of dropping to the ground at the slightest disturbance. It is advisable, therefore, to clear away all rubbish and dry grass from around the posts and trees. The *Xylina*, with their wings closely folded around the abdomen and their colours blending to perfection with the dry grass in most of the species, are very difficult to find by the flickering light of a lantern. Usually when I reached the highest part of my route I could see Mr. Marloff's light circling about in his orchard on the next hill, but on this memorable evening I did not succeed in getting to the summit. The wind in the open field was so high that my light was extinguished, and I had to retire to the lower section of the hill. Five trips over part of the route were made, and 72 *Scopelosoma*, representing six species, were taken up to 11 p. m. The appearance of these kinds in such numbers was a novelty to me and I paid little attention to the common forms. *Anticarsia gemmatilis* was taken for the first time in my experience.

On the following two days, October 23rd and 24th, the weather was cold, with frosts at night. Eleven *Xylina* were collected about dusk on these days. The weather moderated considerably on the 25th, and after a cloudy day, a cool, drizzling rain set in about dusk. With an easy breeze stirring, matters looked very favourable for a good catch. The entire collecting route was gone over five times that evening and 91 *Scopelosoma*, 3 *Glæa sericea*, several interesting kinds of *Xylina* and some of the common forms of the latter were taken. At nearly midnight I left off with 118 specimens safely stored away to be mounted. Frosty nights prevailed after this, but with the exception of several evenings a few moths were always found about dusk until November 7th. A cold, drizzling rain fell that evening and 27 specimens were collected. These represented *Scopelosoma* and *Xylina*. On the following day it was cool and the atmosphere very heavy and damp. The captures that evening were 28 specimens. Up to November 18th but little collecting was done, owing to intervening cold weather. The following three days were warm and 180 moths were taken,

including 108 *Scopelosoma*, some of the rarer *Xylina* and one *Glæa signata*. Several kinds of moths reappeared on November 20th, which had not been observed for more than two weeks. *Peridroma saucia*, *Agrotis ypsilon* and about a dozen *Orthosia bicolorago* were seen ; the latter were all worn. *Hypena scabra* also was frequently noticed, but it is very sly and does not easily submit to capture.

On November 21st it was too cold for anything to stir, and on the morning of the 22nd there was a heavy frost. It turned warmer during the day, and 22 specimens were taken after dusk. Among these was a male *Hybernia tiliaria*, which was encountered flying in the pasture field. After a short chase, it settled on a weed and was bottled. Cold and damp nights prevailed up to November 28th, and but few moths were observed. November 29th was warm and cloudy, with a trace of rain. I took 44 specimens, representing three species of *Scopelosoma*, *Xylina unimoda*, *Peridroma saucia*, *Agrotis ypsilon*, *Homoptera lunata* and *Hypena scabra*.

Snow and frost held sway after this until December 23rd, when a thawing spell set in. By the evening of the 25th the snow had disappeared and the weather was quite warm. Out of mere curiosity, I took a walk after dusk over the collecting route and observed 21 specimens. No lure had been applied since late in November, but the thawing out of the old crusts on the trees was sufficient to offer attraction. With the exception of one *Xylina antennata*, all specimens observed were the common species of *Scopelosoma*. These looked very much worn and bedraggled, and it seems as if their abode over winter is among the leaves on the ground. December 26th and 27th offered opportunities for collecting, and *Hypena scabra* was observed in addition to the other hibernating species. On the morning of December 28th the ground was covered with snow and a very cutting wind prevailed. Cold weather continued until December 30th. By January 1st, 1905, the snow had disappeared and an ideal bright day ushered in the New Year. In company with Mr. Marloff, both our routes were gone over that evening and a dozen specimens were found.

By this time I had acquired a fancy for collecting on rainy evenings. On the 2nd I decided to freshen up the baited trees, and went over the route supplied with a bucket of rotten apples. Although the day was cloudy, it was quite daylight yet, and I was surprised to find *Scopelosoma* resting on the bait on the first few trees I came to in the woods. Several were observed flying to the trees, and by searching among the leaves at the base of the trees a number were found. The apples were rubbed on the

trees and after dusk I made a second visit. There was quite an assemblage observed for this time of the season. *Xylina unimoda*, *laticinerea*, *antennata* and *Bethunei*, *Scopelosoma Moffatiana*, *tristigmata*, *sidus* and *Morrisoni* were among the captures. Mr. Marloff, in addition to some of these, took two *Scopelosoma devia*. The foregoing may suffice to show under what conditions collecting may be done, and I will record a few observations and experiments made to test the ability of these moths to withstand cold.

Of the captures made on my last trip on January 2nd, some twenty *Scopelosoma* were taken from the jars upon my return home and left to recover. One after the other they came back to life, vibrated their wings for a while and took flight. Soon my room reminded me of a warm summer evening, when the collecting lamp brings in dozens of specimens, with these creatures bobbing along the ceiling. This fancy, however, was disproved by the whistling wind outdoors, giving warning of the approaching blizzard. The temperature dropped rapidly and snow made its appearance. I captured a dozen specimens and let them fly out. Three of these were found the next morning, frozen to the floor of the porch, and two imbedded in snow which had drifted against the side of the house. All specimens were brought into the room and placed near the stove. Those which had the protection of the snow at once made feeble movements, and in less than fifteen minutes flew to the window. The specimens found frozen to the floor and exposed to the cold wind over night did not recover.

One of the remaining specimens in the house was found one morning frozen in a thin sheet of ice which had formed in a vessel. It was placed near the stove to thaw out and soon crawled about. After a rest in a warm position for half an hour, it flew away to the window, none the worse for its experience. The wonderful vitality of this creature surprised me, and I decided on a more severe test. A specimen was immersed in water and this left to freeze into a solid lump of ice. With the exception of the upper part of the thorax, the specimen was encrusted in ice. It was left in this condition for twenty-four hours and then placed in the room to thaw out. When the ice had melted the moth appeared to be dead. It was thoroughly water-soaked and I placed it near the stove to dry off. Feeble movements of its forelegs were observed about an hour later, and gradually it became more active and crawled about. This specimen was kept alive for more than a week. Several times it was placed on a piece

of mushy apple and was observed to feed. It did not regain its power of flight, but was able to freely vibrate the wings.

I dissected about twenty females of different species of *Scopelosoma* from the captures of December and January, in search of ova, but none were found. So we have an interesting problem: Why do these moths hibernate?

Any person residing in a section where the surface of the ground is of a rolling nature will have observed the early autumn frosts destroying tender vegetation in the valleys long before any harm is done to plants in higher situations. In my travels up and down the hill during this collecting period I noticed that the change in the temperature in this short difference in altitude was remarkable. Many evenings when the air was very cold in the valley and always followed by severe hoarfrost during night, no moths were observed until half way up the hill, when I reached what I might call the frost line. Only reversed from the usual application of this term in relation to higher mountain sections; the frost extended down instead of up the hill. On rainy nights and during generally warm weather the moths were evenly distributed over hill and valley and some good captures were made in my lot on the baited posts.

An interesting phase in the study of insects is the distribution of certain species. For instance, in the case of *Scopelosoma* and *Glæa*, which apparently find their food-plants among the hard timbers, Mr. Marloff, although he collected just as diligently as I did and over considerable territory, took but few of the former in comparison to the material I collected, and *Glæa* were nearly totally absent in his section. The woods are farther removed from his collecting grounds, and it would seem as if these moths do not venture very far from their breeding place. Again, several kinds were taken by Mr. Marloff during this period which did not occur at all with me. These probably find their food among fruit trees, berry fields or other vegetation in farm lands which are the environments of that section. Although a certain species may range over a large territory, it may, nevertheless, be extremely rare in intermediate sections between the known limits of its habitat, all depending on the absence or presence of the natural conditions favourable to the existence of its kind. During October and November I took thirteen species of *Xylina* here, some of which are reported common in the New England States and some occur as far west as British Columbia. Leaving *antennata*, *laticinerea*, *Grotei* and *unimoda* out of consideration, I may safely say that the balance are

quite rare here when I consider the time spent and the extent of the territory collected over by myself and Mr. Marloff. Our captures of *Bethunei* were twenty, and of *ferrealis* nine specimens. The other kinds occurred in one, two or three examples only.

Apparently, collecting of a similar nature to that described here was done by Mr. Charles F. Goodhue, of Webster, N.H., if we may judge from his very creditable list of Noctuidæ published in "Entomological News," Vol. X., page 221. If we speculate on the possibilities of what might be accomplished in the course of a few years if all Lepidopterists who have the suitable environments would turn in and do a little work on this basis, it certainly seems natural to wish that all would do so. Not only late in the fall but early in the spring and all through the season should the different methods of collecting be practised, if one desires to have the fauna of his locality approximately complete. The collecting of all caterpillars unknown to the collector and the rearing of these to maturity is a very essential part in the study of entomology and should not be neglected. The beginner will derive more knowledge from carefully observing the life-history of half a dozen species than by rushing in and accumulating a thousand more or less dilapidated looking creatures in a year. In most cases these first captures tumble about in all manners of boxes, and in a year or two, when the eye is trained to notice the appearance of properly prepared material, they are discarded and the work is done over again. It is a pleasure to possess a collection, be it ever so small, if nicely arranged. By making the proper beginning—that is, starting slow and learning to know the species in the collection—the student gradually gains an intimate knowledge of the classification of insects, and his interest deepens as the years pass by.

List of species taken at sugar during the period mentioned in the preceding paper :

Perigea xanthioides, *Guenée.*—Oct. 10–20. Common.
" vecors, *Guenée.*—Oct. 5–20. Common.
Oligia grata, *Hübner.*—Oct. 4–17. Common.
Hadena mactata, *Grote.*—Oct. 3–19. Fairly common.
Pyrophila pyramidoides, *Guenée.*—Oct. 3–29. Common.
Prodenia commelinæ, *Smith* and *Abbot.*—Oct. 5. One specimen. (Engel.)
Prodenia ornithogalli, *Guenée.*—Oct. 5–18. Not abundant this season.

Laphygma frugiperda, *Smith and Abbot.*—Oct. 7–18. Rare this season.

Magusa dissidens, *Felder.*—Oct. 10–17. Two specimens. (Marloff.)

Agrotis badinodis, *Grote.*—Oct. 3–20. Not abundant.

" ypsilon, *Rott.*—Oct. 7–Nov. 29. Common.

Peridromia margaritosa, *Haworth.*—Oct. 3–29. Common.

" incivis, *Guenée.*—Oct. 1–20. Four specimens. (Marloff.)

Feltia annexa, *Treit.*—Oct. 25. Two specimens. (Marloff.)

Paragrotis Bostoniensis, *Grote.*—Oct. 4–17. Rare.

Heliophila unipuncta, *Haworth.*—Oct. 7–20. Common.

" pseudargyria, *Guenée.*—Oct. 4–20. Not common.

" multilinea, *Walker.*—Oct. 18–Nov. 4. Rare.

Xylina disposita, *Morrison.*—Oct. 20–25. Two specimens.

" antennata, *Walker.*—Oct. 5–Jan. 2. Abundant.

" laticinerea, *Grote.*—Oct. 16–Jan. 2. Common.

" Grotei, *Riley.*—Oct. 19–Nov. 20. Fairly common.

" ferrealis, *Grote.*—Oct. 4–Nov. 20. Nine specimens.

" signosa, *Walker.*—Oct. 2–20. Three specimens. (Marloff.)

" innominata, *Smith.*—Oct. 20–Nov. 20. Two specimens.

" Bethunei, *Grote and Rob.*—Oct. 1–Jan. 2. Twenty specimens.

" oriunda, *Grote.*—Oct. 8. One specimen. (Engel.)

" unimoda, *Lintner.*—Oct. 16–Jan. 2. Abundant.

" tepida, *Grote.*—Oct. 17. One specimen. (Engel.)

" querquera, *Grote.*—Oct. 20. One specimen. (Engel.)

" nigrescens, *Engel.*—Oct. 25–Nov. 20. Three specimens. (Engel.)

" pexata, *Grote.*—Oct. 2–Nov. 8. Three specimens.

Calocampa curvimacula, *Morrison.*—Oct. 16–Nov. 2. Five specimens. (Marloff.)

Jodia rufago, *Hübner.* Oct. 20–Nov. 20. Three specimens. (Marloff.)

Eucirrœdia pampina, *Guenée.*—Oct. 4–10. Quite common.

Orthosia bicolorago, *Hübner.*—Oct. 3–Nov. 20. This variable species was the commonest observed, dozens occurring on some of the baited trees.

Scopelosoma indirecta, *Walker.*—Oct. 21. Four specimens.

Scopelosoma Moffatiana, *Grote.*—Oct. 5–Jan. 2. Not rare, most of them occurred late in October.

Scopelosoma Pettiti, *Grote.*—Nov. 8. One specimen. (Engel.)
" tristigmata, *Grote.*—Oct. 13–Jan. 2. Fairly common.
" Walkeri, *Grote.*—Oct. 21–Nov. 20. Rare.
" sidus, *Guenée.*—Oct. 17–Jan. 2. Common.
" Morrisoni, *Grote.*—Oct. 13–Jan. 2. Abundant.
" devia, *Grote.*—Oct. 5–Jan. 2. Ten specimens.
Glæa inulta, *Grote.*—Oct. 4-20. Ten specimens. (Engel.)
" sericea, *Morrison.*—Oct. 2–25. Rare.
" signata, *French.*—Nov. 20. One specimen. (Engel.)
Heliothis armiger, *Hübner.*—Oct. 5–12. Rare.
Alabama argillacea, *Hübner.*—Oct. 5–17. Common.
Anomis erosa, *Hübner.*—Oct. 1–18. Two specimens. (Marloff.)
Galgula hepara, *Guenée.*—Oct. 6–20. Not common this season.
Catocala vidua, *Smith & Abbot.*—Oct. 5. One specimen. (Engel.)
" cara, *Guenée.*—Oct. 8–12. Several specimens.
" piatrix, *Grote.*—Oct. 8–20. Three specimens. (Engel.)
" cerogama, *Guenée.*—Oct. 8. One specimen. (Engel.)
" habilis, *Grote.*—Oct. 10. One specimen. (Engel.)
Hypocala andremona, *Cramer.*—Oct. 10. One specimen. (Marloff.)
Remigia repanda, *Fabricius.*—Oct. 4–15. Common and very variable.
Anticarsia gemmatilis, *Hübner.*—Oct. 21. One specimen. (Engel.)
Homoptera lunata, *Drury.*—Oct. 5–29. Common and extremely variable.
Epizeuxis americalis, *Guenée.*—Oct. 4–10. Several specimens.
Plathypena scabra, *Fabricius.*—Oct. 20-Dec. 27. Common.
Pseudothyatira expultrix, *Grote.*—Oct. 11–Nov. 2. Several specimens. (Marloff.)
Macaria simulata, *Hulst.*—Oct. 4. One specimen. (Marloff.)
Sabulodes transversata, *Drury.*—Oct. 2–25. Common.

PROFESSOR ALPHÆUS S. PACKARD, M.D., PH. D.

It is with profound regret that we record the death of Dr. Packard, which took place at his residence in Providence, Rhode Island, on the 14th of February; he was sixty-six years of age. This distinguished entomologist was the author of a large number of both popular and scientific books and papers on insects during the last forty years. Among the more important of these are his "Guide to the Study of Insects"; "Synopsis of the Bombycidæ of the United States"; "Monograph of the Bombycine Moths of North America, Part i, Notodontidæ;" "Monograph

of the Geometrid Moths of the United States"; "Entomology for Beginners"; "A Text-book of Entomology," etc. He also published a series of class-books for schools and colleges on general Zoology; "Outlines of Comparative Embryology," etc. As long ago as 1877 he was appointed, with the late Prof. Riley and Dr. Cyrus Thomas, a special Entomological Commission by the United States Congress to report upon the depredations of the Rocky Mountain Locust in the Western States and Territories. For this purpose he traversed a large region of country on both sides of the Rocky Mountains and as far as the Pacific cost, and was joint author with his colleagues of the voluminous reports which were subsequently published. In November, 1868, he was elected an honorary member of the Entomological Society of Ontario, and was an occasional contributor to this magazine. At the time of his death he was Professor of Zoology and Geology at Brown University.

BOOK NOTICE.

THE LEPIDOPTERA OF THE KOOTENAI DISTRICT OF BRITISH COLUMBIA — By Harrison G. Dyar. (Proc. U. S. National Museum, vol. xxvii., pages 779-938.)

This paper, published last year, is not a mere list of names, but an annotated record of species collected by Dr. Dyar and others at Kaslo and other places in the mountain districts of Southern and South-eastern British Columbia during 1903, and by Mr. J. W. Cockle, of Kaslo, during several previous seasons. Six hundred and fifty-three species are recorded from the district, from an examination of about 25,000 specimens, and one hundred and sixty-seven species of larvæ are noticed, some of them in all their stages, and a large number of these are described for the first time. There are a number of species new to science described in the paper, and several from the district and out of the same material are treated of that the author has recently described elsewhere. It is rather to be regretted that no references to these are given. Comparison of obscure or doubtful forms with material from other localities is a noteworthy feature, and some changes in synonymy are proffered. Dr. Dyar wishes it to be known that he is willing to send a copy of the paper to any Canadian collector who will write to him for one, as long as his separates last. It should certainly be in the hands of everyone interested in the order.

F. H. WOLLEY DOD.

Mailed March 8th, 1905.



1



1a



2a



2



1b.



1c.



2b.



2c.

E.M.Walker del.

LOCUSTIDAE OF ONTARIO.

The Canadian Entomologist.

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NOTES ON THE LOCUSTIDÆ OF ONTARIO.

BY E. M. WALKER, B. A., M. B., TORONTO.

(Continued from p. 38.)

Sub-family *DECTICINÆ.*

22. ATLANTICUS PACHYMERUS, Burm.—The Shield-back Grasshopper.

Decticus pachymerus, Burm., Handb. der Ent., II., 1838, 712.

Thyreonotus pachymerus, Scudd., Bost. Journ. Nat. Hist., VII., 1862, 453.

Atlanticus pachymerus, Scudd., CAN. ENT., XXVI., 1894, 179.

Measurements: Length of body, ♂ 17–23 mm., ♀ 20–22 mm.; of pronotum, ♂ 8.8–9.3 mm., ♀ 8.5–9 mm.; of hind femora, ♂ 16 mm., ♀ 16.5 mm.; of tegmina, ♂ 7.3–8 mm.; of ovipositor, 18.3–19 mm.

This large brown insect, the "Shield-back Grasshopper," is readily known from all others in our fauna by the large size of the pronotum, which extends back over the first abdominal segment, the rudimentary tegmina in the male and the absence of these organs in the female.

The only Ontario specimens I have seen are three males and two females, which I captured at Arner, Essex Co., on Aug. 9, 1901. They were found in the more open parts of a dry upland wood, consisting chiefly of oak and other hardwoods. Most of them were found on the short grass which was growing on the slopes of a ravine in the wood.

Sub-family *STENOPELMATINÆ.*

The only genus represented in Ontario is *Ceuthophilus*, and it is a very difficult one to deal with, only the matured males of many species being separable in anything like a satisfactory manner.

Through the kindness of Mr. Henshaw I was able to compare my specimens with those in the Scudder collection, and found that our commonest species is undescribed, and that Scudder's types of *terrestris* include two species, one of which is identical with *C. neglectus*, Scudd.

The characters which I find of most value in separating the species of this genus are the form of the sub-genital plate and ninth dorsal segment

of the males. The former, especially, varies greatly in shape, but, strangely enough, has been quite ignored by entomologists.

Key to males of the species of *Ceuthophilus* found in Ontario:

A. Hind margin of 9th dorsal segment of abdomen distinctly emarginate; hind tibiæ arcuate in their basal third 1. *maculatus*.

AA. Hind margin of 9th dorsal segment entire, rounded. Hind tibiæ straight.

B. Outer carina of hind femora with less than 20 spines, usually 12 or 13, well separated from one another 2. *pallidipes*, n. sp.

BB. Outer carina of hind femora with 25–30 small teeth, crowded together over two-thirds or more of its length.

C. Hind femora as long as or barely shorter than hind tibiæ, and not more than 3 times as long as broad; fore femora but little longer than pronotum 3. *neglectus*.

CC. Hind femora distinctly shorter (about one-tenth) than hind tibiæ, 3½ times as long as broad; fore femora at least a third longer than pronotum 4. *terrestris*.

23. CEUTHOPHILUS MACULATUS, Say.—The Spotted Stone Cricket.

Rhaphidophora maculata (Say, MS.), Harris, Ins. Inj. Veg., 1841, 126.

Phalangopsis maculata, Harr., Ins. Inj. Veg., 1862, 155.

Ceuthophilus maculatus, Scudd., Bost. Journ. Nat. Hist., VII., 1862, 434.

Measurements: Length of body, ♂ 14 mm., ♀ 16 mm.; of pronotum, ♂ 4.6 mm., ♀ 4.8 mm.; of anterior femora, ♂ 6.6 mm., ♀ 5.8 mm.; of hind femora, ♂ 15.5 mm., ♀ 15 mm.; of hind tibiæ, ♂ 16 mm., ♀ 15.3 mm.; of ovipositor, 9.3 mm.

On July 1st, 1903, while collecting at Niagara Glen, I found a number of *Ceuthophili* under two or three large flat stones in a dry open wood, just above the Glen. They were nearly all immature, but three males appear to be full-grown, or nearly so, and are easily recognizable as *maculatus*. This is the only time I have come across this species in Ontario, although I have found it common in certain parts of Quebec. It is doubtless, however, pretty generally distributed over the Province, wherever suitable conditions for its existence obtain.

The measurements given are taken from mature examples from the Isle d'Orleans, P. Q., as my Ontario ones, if full-grown, are rather undersized.

I found this species in considerable numbers on the Isle d'Orleans, under flat stones at the bottom of a wooded hill. They were associated with *C. terrestris*.

The best character for distinguishing the males of this species from those of the other species of this region is the emarginate hind margin of the 9th dorsal segment and the peculiar shape (Pl. IV., fig. 1) of the subgenital plate. The fore femora are frequently more than a third longer than the pronotum.

24. CEUTHOPHILUS PALLIDIPES, sp. nov.

Of medium size and moderately stout. Fore femora no stouter than the middle pair, one third or a little more, longer than the pronotum, and about three-sevenths the length of the hind femora. Fore tarsi faintly or no longer than the pronotum, rather slender. Middle femora with 1–3 spines on the front carina, and with 0–3 on the hind besides the genicular spine. Hind femora about as long as the body, moderately stout, about 3½ times as long as broad, the upper margin more convex than the lower, which is nearly straight in its proximal half. A very few raised points usually present on the upper part of the inner surface. Inferior sulcus very narrow, except at apex, rather deep, rounded when not altered in shape by drying. The spines on the outer and inner carinæ in the male are very variable, both in number and size, but are never conspicuous. There may be from 10 to 18 on the outer and 8 to 15 on the inner, but are usually 12 or 13 on each. They are nearly equal in size, and more or less irregularly scattered over the apical half or two-thirds of each carinæ. In the female there are about the same number, or fewer, very minute and delicate spines distributed in a similar manner. Hind tibiæ faintly longer than the femora, moderately slender, the spurs longer than the tibial depth, usually set at an angle of 60° or 70° with the tibiæ, but very variable in this respect. Inner middle calcaria nearly or quite as long as the first tarsal joint. Extremity of male abdomen slightly swollen, the 9th dorsal segment somewhat upturned and produced into a short truncate supra-anal plate, its corners well rounded. Subgenital plate of male large, convex and upturned, divided by a deep median fissure into two spoon-shaped lobes, which slightly overlap in the middle line. Each lobe is about one-half longer than broad, its upper margin nearly straight,

separated from that of the opposite lobe by a V-shaped space, and meeting the straight anterior margin at a right angle. Cerci very nearly as long as the breadth of the hind femora, tapering from a fairly stout base. Ovipositor about three-fifths the length of the hind femora, nearly straight, tapering, especially in the proximal half, the basal third considerably swollen ; apex upturned and sharply pointed. Teeth of inner valves five, sharp, nearly equidistant.

General colour pale reddish-brown. Two broad shining black bands above, fading into pale yellowish-brown half way down the sides of the thorax, and separated by a broad mesial band of orange or reddish-brown, which passes along the thorax to the first or second abdominal segments, where it begins to be broken up into small spots. These spots are small and few on the pronotum, but become larger and more numerous posteriorly, forming tolerably regular transverse rows on the abdominal segments, there being a single row for each segment. The dark colour often becomes more grayish and less shiny on the abdominal segments. Eyes deep black ; antennæ brownish, annulate with pale yellowish. Face, under side of body, and legs, pale reddish or yellowish brown. Fore and middle femora infuscated apically ; hind femora pale reddish-brown, mottled above with darker brown, the usual scalariform markings rather pale, much less distinct than in *C. maculatus* or *terrestris*. Hind tibiæ and tarsi pale yellowish, the spurs deep black at base, pale apically. Cerci reddish-brown, infuscated apically. Ovipositor shining reddish-brown.

Measurements : Length of body, ♂ ♀, 14 mm.; of pronotum, ♂ 4.1 mm., ♀ 4.3 mm.; of fore femora, ♂ ♀, 5.8 mm.; of hind femora, ♂ 13.5 mm., ♀ 14 mm.; of hind tibiæ, ♂ ♀, 14 8 mm.; of ovipositor, 9 mm.

Ten males, 10 females. Niagara Glen, Ont., Aug. 18, 1904 ; Toronto, Aug. 5, 1904 ; De Grassi Pt , Lake Simcoe, July 13–15, 1901, Sept. 7, 1902, July 18, 19, 1904 ; Lake Muskoka (small island) Aug. 27, 1899 ; Ragged Lake, Algonquin Park, Aug. 17, 1903.

This species is most closely related to *C. latens*, Scudd., although differing greatly from that species in the character of the spines on the under side of the hind femora of the male, the latter being also much stouter in *latens*. It closely approaches *latens*, however, in all other respects, including the peculiar structure of the male genitalia. The ovipositor in *latens* is less swollen at base. In colour and markings the two species are nearly identical, but in size *latens* is much the larger.

C. pallidipes is the commonest species of the genus in central Ontario, usually occurring under chunks and small logs in woods. On Aug. 8, 1904, I found them in some numbers on the slope of one of the Rosedale ravines at Toronto, but the area over which they occurred was limited to a few acres. There were two or three or more individuals under nearly every chunk of wood, most of them mature. At De Grassi Point, Lake Simcoe, I have occasionally taken them in rotten sodden logs. In one such log seven adults were found together.

As is commonly the case in *Ceuthophilus*, the young nymphs may be found at any time in the year, for although most of them mature in the summer from eggs hatched in the spring, a few pass the winter as young nymphs, the eggs not having hatched until the fall. They usually reach maturity about the first or second week in July, and continue until the second week in September.

25. CEUTHOPHILUS NEGLECTUS, Scudd.

Ceuthophilus maculatus (pars), Scudd., Bost. Journ. Nat. Hist., VII., 434 (1862).

Ceuthophilus terrestris (pars), Scudd., Proc. Amer. Acad. Arts. Sc., XXX, 46 (1894).

Ceuthophilus neglectus, Scudd., Proc. Amer. Acad. Arts. Sc., XXX., 67 (1894).

I have but one pair of this species, about half grown, taken from under a stone at Niagara Glen, Aug. 18, 1904. A number of very young individuals were also found with them. They were kindly determined for me by Mr. A. P. Morse, who compared them with material in the Scudder collection. I was afterwards able to confirm his determination.

C. neglectus is an eastern species, ranging from Vermont and Northern New York to Virginia.

Figs. 3, 3a, Pl. 5, were drawn from one of Scudder's type specimens. Figs. 3b, 3c are from my immature male, and probably do not exactly represent the form of the subgenital plate in the adult.

26. CEUTHOPHILUS TERRESTRIS, Scudd.

Rhaphidophora lapidicola, Scudd., Proc. Bost. Soc. Nat. Hist., VIII., 7 (1861).

Ceuthophilus lapidicolus, Scudd., Bost. Journ. Nat. Hist., VII., 435 (1862).

Phalangopsis lapidicola, Bess., Rep. Iowa Agric. Coll., VII., 206 (1877).

Ceuthophilus terrestris, Scudd., Proc. Amer. Acad. Arts. Sc., XXX., 46 (1894).

Measurements: Length of body, ♂ 12.5 mm., ♀ 14 mm.; of pronotum, ♂ 4.5 mm., ♀ 4.25 mm.; of fore femora, ♂ 6.3 mm., ♀ 5.75 mm.; of hind femora, ♂ 14.3 mm., ♀ 12.7 mm.; of hind tibiæ, ♂ 15.5 mm., ♀ 14 mm.; of ovipositor, 7.5 mm.

This is the species to which most of Scudder's types belong, but the few mature males in the collection are identical with *neglectus*, and his description of *terrestris* is evidently based partly upon these. His statements regarding the hind femora and tibiæ especially apply to *neglectus*. The chief distinctions between the two species in this particular are given in the above key. The legs in *terrestris* are much longer and more slender; and the scalariform markings on the hind femora much more distinct, closely resembling those of *maculatus*, though usually paler, as Scudder himself has defined them.

C. terrestris has a more northern range than *neglectus*, being characteristic of the Boreal and Transition zones.

The specimens of undoubted *terrestris* in the Scudder collection are from the following localities: Anticosti; Gorham, Norway, and Moosehead, Lake region, Me.; Mt. Washington and Franconia, N. H.

In Ontario I have taken it at Niagara Glen, Aug. 18, 1904; Toronto, Aug. 8, 1904; Goderich, Aug. 19, 1901; De Grassi Pt., Lake Simcoe, June 29, 1901 (half grown), Sept. 7, 1902; and I have also a female from Morris Id., Lake Joseph, Muskoka, taken by Mr. E. M. Morris, July 12, 1888. I have not found *terrestris* common anywhere in Ontario, but came across it in considerable numbers on the Isle d'Orleans, P. Q., Aug., 1904, under flat stones, at the foot of a wooded hill. It was in company with *C. maculatus*.

Mr. J. A. G. Rehn has recently reported the true *terrestris* from Keweenaw Bay, Lake Michigan.

Explanation of Plates.

Plate IV.

Fig. 1. Ceuthophilus maculatus, ♂, Isle d'Orleans, P. Q. (× 3).
1a. Ceuthophilus maculatus, ♂, terminal segments of abdomen from above (× 10).
1b. Ceuthophilus maculatus, ♂, subgenital plate, from below (× 10).
1c. " " " " subgenital plate, lateral view (× 10).
2. " pallidipes, " Lake Simcoe, Ont. (× 3).

Fig. 2a. Ceuthophilus pallidipes, ♂, terminal segment of abdomen (× 10).
2b. " " " subgenital plate, from below (× 10).
2c. " " " subgenital plate, lateral view (× 10).

Plate V.

Fig. 3. Ceuthophilus neglectus, ♂, Scudder's type (× 3).
3a. " " " terminal segments of abdomen (× 10).
3b. " " " subgenital plate, from below (× 10).
3c. " " " subgenital plate, lateral view (× 10).
4. " terrestris, " Isle d' Orleans, P. Q. (× 3).
4a. " " " terminal segments of abdomen (× 10).
4b. " " " subgenital plate, from below (× 10).
4c. " " " subgenital plate, lateral view (× 10).

ASSINIBOIA MICRO-LEPIDOPTERA, COLLECTED BY MR. T. N. WILLING.

BY W. D. KEARFOTT, MONTCLAIR, N. J.

(Continued from page 93.)

Tortrix conflictana, Walk.—Five specimens; Lethbridge, Macleod and Pine Creek; VII., 8, to VII., 13. Larger and the bands more suffused than Eastern specimens.

Tortrix argentana, Clerck.—Three specimens; Macleod and Lethbridge; VIII., 8 to 15. I have a long series of this species from Western America, south nearly to Mexico, and north to British Columbia, likewise a series from Europe, and every time I examine them I am impressed with the feeling that our American species differs from the European, but further study is required before deciding either way, in the meantime the European name can stand. This Tortrix is easily mistaken for *Crambus perlellus*, Scop. See comparative notes under the latter name.

Eulia triferana, Walk.—Two specimens; Regina, VI., 8 to 20, rather badly rubbed, but matching exactly Eastern examples in my collection under this name; this species is either the most variable of all Lepidoptera or else a good many more than one have been lumped under the one name. This is the most Western record I know of.

Phalonia angulatana, Rob.—One specimen; Regina, VI., 18. New Western record, common in the Eastern States, and recorded from Texas.

PYRALIDÆ.

Nomophila noctuella, Schiff.—One specimen; Regina, IX., 5. Common in all known regions of the world.

Loxostege chortalis, Grt.—Six specimens ; Regina, VI., 18. Rather common, wherever it is found, from North Atlantic States westward. A dainty quaker-gray species, with fine rippling lines of a darker shade.

Pyrausta submedialis, Grt.—Nine specimens ; Regina, VII., 11, to VIII., 11. Eight of typical light form, one very dark, lines almost obsolete.

Pyrausta unifascialis, Pack.—Three specimens ; Calgary, VI., 6 ; Macleod, VII., 2; Saltcoats, (?) VII., 13. This is quite common throughout the West, and is subject to a very wide range of variation, both in size and colour, as the several synonyms indicate.

Pyrausta fodinalis, Led.—Three specimens; Macleod, VI., 28–VII., 2 ; Calgary, VII., 6.

Pyrausta ochosalis, Dyar (not Fitch).—Two specimens ; Macleod, VII., 3 ; Pine Creek, VII., 11. Recorded from Kaslo, by Dyar, and very well represented by fig. 57, plate XLVII., in Holland's Moth Book.

Loxostege sticticalis, Linn.—Twelve specimens ; Regina, VI., 8, to VIII., 15 ; Calgary, VII., 6 ; Abernethy, VI., 27 ; Indian Head, VI., 29. This common species is found throughout the Middle Northwest.

Loxostege commixtalis, Walk.—Two specimens ; Regina, VI., 18, very similar to preceding, but can be separated by the yellow outer marginal line which widens into a narrow irregular fascia, and the presence of numerous short horizontal black lines and dots.

Cornifrons simalis, Grt.—One specimen ; Lethbridge, VII., 11. Recorded by Dyar, from Kalso, previous records Montana and Oregon. I have a long series from Utah (Poling).

Scoparia centuriella, Schiff.—Three specimens ; Lethbridge, VII., 11. Pine Creek, VII., 13 ; Calgary, VIII., 1.

Pyralis farinalis, Linn.—One specimen ; Lethbridge, VII., 11. This is the common Grain-moth treated of in all lists of injurious insects; it probably feeds on a number of roots and stored foods ; I have bred it from dried Tulip and Crocus bulbs.

Crambus plumbifimbriellus, Dyar.—Five specimens ; Lethbridge, VII., 11.

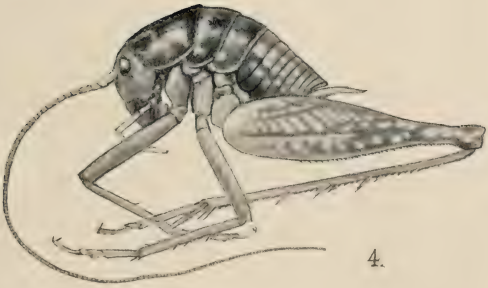
Crambus perlellus, Scop.—Nine specimens ; Regina, Lethbridge, Macleod and St. Albert, VII., 3, to VIII., 15. This pure pearly-white Crambid is reported by Dr. Fletcher and Mr. Willing to occur in myriads, every step through the grass of the prairie lands disturbing dozens. This species is very often confounded with *Tortrix argentana*, Clerck. The



3



3a.



4.



4a.



3b



3c.



4b.



4c.

E.M.Walker, del.

LOCUSTIDAE OF ONTARIO.

coloration and size of both are identical, and they can only be separated by structural characters. The easiest to observe is the length of the palpi, which in the Tortrix is hardly as long as the head, while in the Crambid the palpi project forward between two and three times the length of the head.

Crambus pascuellus, Linn.—Two specimens; Lethbridge, VII., 11. I have no Eastern or European examples of this species, it compares exactly with a long series from Verdi, Nev., (Vachell), and South Utah, (Poling). Fernald states that the larvæ feed on grass, and habitat from Massachusetts to California and Europe.

Crambus trisectus, Walk.—Seven specimens; Regina, VIII., 13. Do not differ from a long series from Colorado (Nash), Manitoba (Heath), and other Western localities. Can be easily identified, as it is one of the largest of the pale- or ashy-brown species without metallic ornamentation, with two oblique darker brown lines parallel to outer margin, one about middle of wing, the other between it and margin; these dark lines are easily rubbed off, and while some specimens show only the costal half, in others it is almost obliterated. Fernald's figure, in Crambidæ of North America, is as much unlike this species as it is possible to draw it.

Thaumatopsis Fernaldella, sp. nov.—Head, palpi, thorax, abdomen, egs, and front wing, light ochreous-brown, or pale fawn-colour.

Front wing: A darker shade of brown along costa from base to inner third.

A median white streak from base to end of cell, beginning at base as a line and widening on its lower edge until it involves the whole width of cell at its outer end. The lower edge of this streak overlaid with a line of dark brown scales and a shade of lighter brown above the dark line. Above the white streak is a brown shade from inner third to apex, interrupted at end of cell, a thin, very dark line between this shade and the white. Beyond end of cell the white streak is outlined by a brown shade forming an abbreviated transverse fascia.

A narrow white sub-terminal fascia, overlaid with silvery-metallic scales from dark shade to dorsal margin, is bounded inwardly and outwardly by brown lines. Between end of cell and sub-terminal line, the veins are white, vein vii. being most pronounced and the white line over this vein is the one that interrupts and indents the brown shades above median white streak. A short, oblique streak of brown on middle of dorsal margin. On costa, before apex, a pale spot, and adjoining it

towards base a slighter darker spot, both of which are the terminations of faint, almost obsolete lines of these colours lying above dark median shades. Seven dark purple or black dots on extreme outer margin, one at end of each vein, the space between these dots and sub-terminal line, ground colour, not crossed by white or brown lines. Cilia white, dotted with fuscous, and with a narrow, silvery-white metallic line at its base, through which runs a thin line of fuscous.

Hind wing: Above and beneath pale fuscous with a purplish reflection, in some specimens nearly white towards base; cilia white. Under side front wing brownish-fuscous.

Antennæ pectinate in ♂. Expanse 23 to 31 mm.

Sixteen specimens; Anglesea, N. J., June and September; Key West, Fla.; Las Cruces, N. M., (Cockerell 2071); Walter's St., Cal., April, (J. B. Smith); Yellowstone Park, Wyo., July, (H. S. Burrison); Fort Collins, Colo., August, (C. F. Baker); South Utah, July, (W. Barnes, M. D.). Co-types U. S. Nat. Mus., No. 8218; collections of Prof. Fernald, and my collection.

The Key West specimen is the most strongly marked; it differs from all of the others in several particulars, notably: The transverse median line is well defined and continued to dorsal margin, but interrupted between each vein; between the dorsal margin and median streak are a number of white horizontal dashes and the sub-terminal line curves inward to a greater degree, leaving a much wider space between it and termen. This specimen is, therefore, included with a question mark.

Fernald's figure of *T. edonis*, Grt., very fairly represents the markings of the front wings of typical specimens, and I should have been inclined to refer my specimens to Grote's species, but Prof. Fernald assures me that they are not the same, and I take pleasure in bestowing his name on this widely-distributed species.

I have specimens from Mr. Willing that are marked very much the same as *Fernaldella*, but the colours are ashy-gray, with no ochreous shades, these may prove to be a distinct species, but I prefer to regard it at present as a variety.

Thaumatopsis Fernaldella, var. *nortella*, var. nov.—Palpi pale gray, heavily speckled with dark purplish; antennæ same, pectinate in ♂; head and thorax cinereous.

Fore wing: Ashy-gray, with median white streak and dark shades same as *Fernaldella*, but latter much more intense, nearly black. The transverse dark shade at end of cell is absent, and the white median streak

continues outward to termen, in a broad white shade. The sub-terminal line is obsolete and the row of black dots nearly so. Hind wings less white and more whitish-purple or ashy-white.

Seven specimens; Regina, VII., 20, to VIII., 13; Lethbridge, VII., 11; Pincher, VII., 10. Co-types, U. S. Nat. Mus., No. 8219; Mr. Willing's collection and my collection.

Ambesa lætella, Grt.—Two specimens; Regina, VII., 20.

Laodamia fusca, Haw.—Three specimens; Regina, VIII., 13.

Epischnia Boisduvaliella, Gn.—Four specimens; Regina, VI., 18; VIII., 13, and IX., 2.

Hulstia undulatella, Cl.—Four specimens; Lethbridge, VII., 11.

Homœosoma electellum, Hulst.—One specimen; Regina. Bred from larva on buds of *Grindelia*. Larva, IX., 19; issued X., 5. Accompanying this specimen is a very well preserved larva, and at the request of Dr. Dyar I make the following brief description:

Length, 11 mm. Robust, cylindrical, thoracic segments tapering to head. Diameter through abdominal segments, 2 mm.; width head, 1 mm. The larva is very beautifully marked with five purple and four yellow streaks from head to anal segment. The dorsal stripe is purple, one sub-dorsal and one sub-spiracular on each side of the same colour. Between these bands are yellow stripes of about half the width of the purple; doubtless the yellow of the dried larva was a dull or light green when alive. Ventral region dull ochreous-yellow (also green naturally?).

Head: Small, rounded, retracted, not outstretched, light chestnut brown, mouth-parts and ocellic field dark brown and a horizontal black streak caudad from latter on each lobe, ocelli pale luteous, raised like tiny drops of dew. Antennæ either very short or broken off of this specimen. Clypeus high, sides straight, triangularly to a point at top of head. P. t. shield large, chitinous, shining ochreous, with a posterior black line on dorsum, extending down on each side and enlarging into an ovate black spot; narrowly surrounding this spot, except posteriorly, is a pale yellow line. Thoracic feet very dark brown or black, short. Four pairs abdominal and one pair anal feet, crochets well developed, in closed circles, hooks brown. Anal shield small, hardly chitinous, cinereous. Setæ short. Tubercles: Abdominal segments: i. very slightly dorsad to ii.; iii. dorsad and slightly caudad to spiracle; iv. and v. ventrad to spiracle, close together, vertical to each other, but not on same plate; vi. and vii. in usual positions: Meso-thoracic segment; ia. & ib.; iia. & iib.

Peoria approximella, Walk.—One typical specimen; Regina, VII., 20. I am indebted to Dr. Dyar for names of all Phycits.

YPONOMEUTIDÆ.

Choreutis extrincicella, Dyar.—One specimen; Regina, VI., 24. Exactly the same as type, can be easily separated from any other species of this genus, by the narrow white transverse line beyond base, and the radiating white lines in outer quarter.

GELECHIIDÆ.

Gelechia variabilis, Busck.—One specimen; Regina, VIII., 15.

Gelechia albisparsella, Cham.—Three specimens; Lethbridge, VII., 11.

Gelechia nigrimaculella, Busck.—One specimen; Regina, VIII.,23.

Gelechia ornatifimbriella, Clem.—One specimen; Regina, VI., 18.

Gnorimoschema triocellella, Cham.—Seven specimens; Regina, V., 15, to VI., 15.

Trichotaphe juncidella, Clem.—One specimen; Regina, VIII., 15.

Ypsolophus ligulellus, Hbn.—One specimen; Regina, IX., 2.

ŒCOPHORIDÆ.

Depressaria argillacea, Wlsm.—One specimen; Regina, IV., 29.

Semioscopsis inornata, Wlsm.—One ♀; Red Deer, IV., 18. This species has also been recently received from Mr. Heath and Mr. Criddle, and fully bears out Dr. Dyar's conclusions (*ante* xxxiv., p. 319), that it is distinct. It more nearly resembles a large gray Geometrid, and seems much out of place in the Micro-Lepidoptera. I believe this is the first record of capture since the original description. In Bul. 52, U. S. N. M., the locality is "unknown."

TINEIDÆ.

Tineola bisselliella, Hum.—Two specimens; Regina, VI., 7–8. The common clothes moth.

Tinea croceoverticella, Cham.—Two specimens; Regina, V., 29–VI., 3, labelled "in house." I am not entirely certain of this identification.

Tinea granella, Linn.—One specimen; Regina, VI., 15. Rather badly broken, but the identification seems good.

Besides the above, there are two or three species that I cannot make out at this time.

Since completing the above notes Mr. Willing has been good enough to send me a large map of a part of the Northwest Territories, from which I add the following to better identify the localities mentioned.

Regina and Indian Head are in the Eastern part of Assiniboia, about the middle of the great wheat belt.

Medicine Hat is in the Western end of the same Province.

Lethbridge, Macleod and Pincher are just above the United States line in the Southern end of Alberta.

St. Albert is the Northern terminus of the Calgary and Strathcona (Edmonton) branch of the C. P. R., and nearly the Northern end of Alberta.

Pine Creek is in Alberta, between Macleod and St. Albert.

From the apparent topography, I assume all of the Assiniboia localities are in the great stretch of prairie land, which likely partially continues into the Eastern half of Alberta; Pincher and Pine Creek are in the lower foot-hills, and St. Albert in the vast forest and lake districts of the Northwest.

THE GENUS VENUSIA AND ITS INCLUDED SPECIES.

BY RICHARD F. PEARSALL, BROOKLYN, N. Y.

If it were necessary to emphasize the need of revision in the Geometrina, the genus Venusia furnishes an excellent example. It was established by Curtis, an English writer, in 1839, with *cambrica*, Curt., as its type. Since that time, three additional species, according to Mr. Meyrick, from New Zealand have been placed under it. In our own fauna, Dr. Hulst placed three species as its representatives—*cambrica*, Curt., *comptaria*, Walk., *duodecimlineata*, Pack. *Cambrica*, the type, has a world-wide distribution. It flies in England, in Northern Europe, across Northern Asia, in Japan, and in the north temperate zone of America. *Comptaria* is found in Canada, the mountainous regions of New England and New York, and along the Appalachian range as far south as Pennsylvania and probably farther; *duodecimlineata* comes from northern California, and with it, under this name, have been associated examples taken in British Columbia; and another series found in the East, ranging from the vicinity of New York City, southward into Pennsylvania and probably into the hill regions beyond. During many years collecting in the Catskill Mountain region, I have never taken it there, while *cambrica* and *comptaria* were abundant.

Briefly, I will state that the chief distinguishing character of Venusia, is the bipectinate antennæ of the males. In the group I have mentioned, *cambrica* is the only species possessing this structure, and it is my opinion, that here, as in Europe, it is the sole representative of its genus. *Comp-*

taria has the male antennæ filiform and strongly ciliate beneath, hence its place is in the allied genus Euchoeca, Hüb., with which in other respects it perfectly agrees. *Duodecimlineata* was stated by Dr. Packard to have pectinate antennæ (Monograph of Geometrid Moths, 1876, page 83), where he characterizes the genus Epirrhita, Hüb., under which he places it, but in his description (page 84), he states merely that they are "well ciliated." In both he was correct, but he failed to observe that his species possessed that anomaly in construction, *unipectinate* antennæ, the single row of pectinations beneath, being flanked on either side by a row of cilia, and tipped with a fascicle of hairs, the apex being simple. For some time I tried to convince myself that they should be called serrate, but the pectinations are long and proceed from the centre of each joint, and are not an enlargement of either end. This structure removes it from Venusia, and necessitates the erection of a new genus, since, so far as I am aware, none has been established to cover the requirements found in its construction. I give it, therefore, a name, NOMENIA, n. g., and the species will be known as *Nomenia duodecimlineata*, Pack. It is defined as follows :

NOMENIA, n. g.

Palpi short, slender, scaled ; front rounded, smooth scaled ; tongue developed ; antennæ of ♂ unipectinate, pectinations tipped with a fascicle of hairs, and on each side a row of cilia, apex simple, in ♀ filiform simple, thorax and abdomen untufted ; fore tibiæ unarmed, hind tibiæ with all spurs in both sexes slender, without hair pencil in ♂ ; fore wings, one accessory cell, 12 veins, 3 and 4 separate 6 and 7 from point ; hind wings 8 veins, 3 and 4 separate 6 and 7, long stemmed, 8 with cell to beyond middle.

It seems strange that this species should have passed under the hands of many able observers, and yet that this antennal feature should have been unnoticed, and stranger still that the forms from British Columbia, and from the East, with their simple ciliate antennæ in the males, should have been so long associated with it. These latter are one species, which belongs to the genus Euchœca, Hüb., and is nameless. The ground colour is paler, and, as is frequently the case, the Western form is larger, but aside from this I can find no difference in structure or markings. It will be known hereafter as

Euchœca salienta, n. sp.—Of the same form with its congeners, the ground colour of both wings above, pale ashen in Eastern, nearly white in Western specimens, sparingly mixed with dark brown or black scales.

Front broad, rounded, dark brown; above pale ashen. Antennæ compressed, fringed with cilia in ♂, simple filiform in ♀; fore wings crossed by about five fine double lines. Of the first four pair, the fine inner line is black, the other a diffused yellow-brown, the fifth pair being black, and generally consisting of points on the venules, sometimes continuous and waved. A line of black intervenular marginal spots; fringes on both wings white, double, the short scales tipped with dark brown, which forms a dusky streak through the centre. All the lines are angulate outwardly just below the costa, are waved throughout their course, which is nearly straight across to inner margin; sometimes the trend is slightly basal and the lines are heavier and darker at costa and inner margin. The extra discal black line is clearly defined, with a large angle at costa, and an outward curve at end of cell, and its brown shade line is broader, sometimes including two black venular dashes at end of cell, but these are not present in *all* specimens. The discal space is small and paler and between the extra discal shade line and the sub-terminal lines, a clear, pale, line-like space crosses both front and hind wings, following the waving of the preceding lines, terminal space dusky. Hind wings with about four parallel dusky cross-lines, the two inner more distinct and curved out opposite cell, the outer frequently reduced to venular dots; intervenular marginal spots, as in fore wing, terminal space dusky. Discal spots small, obscure, that on hind wings included in basal line. Beneath, more dusky; fore wings with only four outer lines reproduced, all dusky, the pale, line-like space showing through, and continuous as above on both wings, the lines on each side of it heavier and black at costa. Hind wings with all lines reproduced, dusky. A row of black intervenular marginal spots on both wings, terminal space darker, discal spots small, often obscure. Abdomen ashen above, white below; fore legs dark brown, hind legs lighter, all tarsi banded with yellowish-white.

Types ♂ ♀; coll. of R. F. Pearsall.

As compared with *comptaria*, its nearest ally, this species is thinner winged, its ground colour bluish-ash, not clear white as in *comptaria*, and all the lines are finer, not so diffuse, the brown lines especially. The above species should now be listed thus:

Venusia cambrica, Curt.
Nomenia duodecimlineata, Pack.
Euchœca comptaria, Walk.
" salienta, Pearsall.

This paper shows how slowly must proceed any revisional work, and that no section of the group can be thought finished until every species in that section has been studied and compared. I will be much indebted to entomologists, particularly in the West, who will send me material in this order, for it is my desire to make my work as thorough in character as is possible.

THE TYPES OF THE LATE DR. HULST.

BY HARRISON G. DYAR, WASHINGTON, D. C.

I am glad that Mr. Taylor has shown in the Feb. CAN. ENT. that the "types" of *Somatolophia umbripennis* and *Diastictis festa* in the Hulst collection at New Brunswick, N. J., are not the true types. A specimen that contradicts the description cannot be the type, however labelled, unless it can be shown that the author has made an error. I do not think that Dr. Hulst made errors in description in these cases, and I do not think either that the true types were destroyed as Mr. Taylor suggests. More probably they exist in some collection. Will not every reader of this note, who has Hulst types, look to see if he has these species, and if so, kindly communicate with Mr. Taylor or with me? Mr. Doll recently drew my attention to a series of Hulst types in the Museum of the Brooklyn Institute that had been presented by Dr. Hulst. Some were likewise presented to the U. S. National Museum, and perhaps to other collections. In other cases he has no doubt described from borrowed material which was afterward returned.

In the material at Brooklyn I found the "true type" of *Mycterophora Slossoniæ*, the Manitoba specimen. It is congeneric with the other species of *Mycterophora* and has the whitish costal stripe as described. The New Hampshire specimen in the Hulst collection is a *Homopyralis* with the costa denuded, as I have shown. It is not really the type, although so labelled, before Dr. Hulst, when describing, referred to in the description and suggesting the name given. The description was taken from the other specimen.

There exist a number of "types," descriptions of which were not published by Dr. Hulst up to the time of his death; but specimens were labelled, evidently with the intention of description. Some of these names have been allowed to appear in Smith's List of 1903. Of one such there are two "types" in the Brooklyn Museum, under a well-known genus of Geometridæ, which I shall not mention for fear of establishing the manuscript name. The two types are respectively a specimen of *Oreta irrorata*, Pack., from Florida, and one of *Drepana cultraria*, Fab., from Europe, with a false "N. J." label. Comment is superfluous.

April, 1905.

MOSQUITO NOTES.—No. 3.

BY C. S. LUDLOW, M. SC.,
Laboratory of the Office of the Surgeon General, U. S. A., Washington, D. C.

(Continued from page 102.)

Stethomyia pallida, n. sp.— ♀. Head light testaceous, a few white flat lanceolate scales on the vertex, otherwise clothed with sparsely set slender hair-like curved brown scales, nearly as long as the very slender fork scales which occur on the occiput; two light brown bristles project forward between the eyes, and a few around the eyes. The head shows no sign of having been denuded, and besides the slender hair-like scales is covered with a short fine tomentum or frostiness, such as is often seen on the thorax of Anophelina. Antennæ brown, verticels brown, pubescence white, basal joint testaceous with frosty tomentum; palpi long and slender, covered ventrally with the short fine hairs of the frosty tomentum, dorsally with small flat brown scales, a couple of bristles or long hairs at the apex; proboscis light brown, covered with very thin flat scales and curved hair-like scales, a few bristles at the base, tip lighter; eyes dark brown; clypeus light, with frosty tomentum.

Thorax light testaceous, sparsely covered with hair-like brown curved scales, and frosty tomentum, prothoracic lobes a little darker, and with curved hair-like scales; scutellum like mesonotum; pleura light, with a few groups of hair-like curved brown scales; metanotum brown.

Abdomen apparently mottled brown and light, but this may be due to drying, and clothed with rather long brown hairs.

Legs unusually long and slender; coxæ and trochanters light, with a few hair-like curved brown scales. Remainder of the legs light, covered with small, thin brown scales, which, in some lights, however, look much darker, with almost purple iridescence, in other lights almost fawn colour. Ungues simple and equal.

Wing clear, brown scaled, with lanceolate scales; the 1st submarginal extremely long, nearly twice as long as the second posterior cell, and a little narrower, the stem about half the length of the cell, and a third shorter than that of the 2nd posterior; cross-veins close together, and all about the same length, the supernumerary about half its length interior to the mid, and the posterior about its own length interior to the mid. Halteres, stem light, knob dark.

Length, 3.5 mm. (legs more than 10 mm.)

Habitat.—Camp Stotsenberg, Angeles, Pampanga, Luzon, P. I. Taken Sept.? "Caught in the woods."

Described from one very perfect specimen sent by Dr. Whitmore in the collection referred to below.

In spite of the fact that the prothoracic lobes are not mammillated, and indeed seem stalked, the other characteristics point so strongly to *Stethomyia* that I have decided to put this insect under that genus.

HEIZMANNIA, nov. gen.

Head covered with broad flat scales ; thorax with flat spindle-shaped scales, very broad on the lateral thirds of the mesonotum ; scutellum with broad flat scales ; metanotum with large median bunch of chætæ (not less than 16–20) on caudad half; wing scales somewhat resembling Tæniorhynchus scales, but the median scales at times inclined to be asymmetrical. Cells small. Ungues in female simple and equal.

This genus evidemtly lies near *Dendromyia*, Theobald, but Mr. Theobald says it cannot be included under that genus, the large bunch of bristles on the mesonotum being too marked a characteristic, and I therefore give it a place by itself.

It is named after Col. C. L. Heizmann, Asst. Surgeon-General, U. S. A., whose continued interest in and effective support of this research, extending over several years, have been invaluable in making possible such success as has been attained.

Heizmannia scintillans, n. sp.— ♀. Head brown, with brown flat, iridescent (peacock blues and greens) scales, heavy white rim around the eyes, and a white spot between the eyes (at point of vertex), brown bristles projecting forward ; antennæ mostly gone, basal joint brown, with short fine hairs on the median side ; palpi brown ; proboscis brown ; a few bristles at the base ; eyes brown ; clypeus brown.

Thorax brown ; mesonotum densely covered with dark flat, broadly spindle-shaped iridescent scales ; prothoracic lobes heavily covered with broad flat, white scales ; pleura brown, thickly covered with broad flat, white scales ; scutellum brown, densely covered with broad flat, brown iridescent scales ; metanotum rich brown, with heavy median bunch of brown bristles (not less than 16–20) on caudad half.

Abdomen dark, densely covered with broad dark (almost black) flat iridescent scales ; the venter with broad white bands, very broad on the cephalic segments, which extend so far around as to appear from the dorsal aspect like basal lateral white spots.

Legs, coxæ and trochanters light ; femora of hind legs ventrally light, less so on the other legs, and otherwise the legs are dark brown; metatarsi and tarsi of fore and mid legs in some lights are almost a fawn colour ; hind tarsi are missing. All the ungues equal and simple.

Wings clear, with heavy brown scales resembling those found in *Tæniorhynchus*, but the median scales, especially on costa, subcosta and 1st longitudinal veins, heavier and inclined at times to be asymmetrical; cells short; 1st submarginal a little longer, and about the same width as 2nd posterior cell, the stems a little shorter than the cells; supernumerary and mid cross-veins are about the same length, and meet the posterior cross-vein a little longer, and one and a half times its length distant. Halteres have white stem and knob dark.

Length, about 4 mm.; proboscis, 2 mm.

Habitat.—Camp Stotzenberg, Angeles, Papanga, Luzon, P. I. Taken Sept. ?

Described from one specimen, perfect except as to the antennæ, sent by Dr. Whitmore.

Anisocheleomyia ? albitarsis, n. sp.— ♀. Head brown, covered with very large, long flat scales, so loosely applied as to make the head look shaggy, a wide median white stripe extending from occiput to vertex, a few white scales and two brown bristles projecting forward between the eyes, a narrow white line around the eyes, the scales long and flat and projecting forward over the eyes, also some brown bristles; laterad to this broad median stripe is a broad, brown stripe, a narrow white stripe, a narrow brown and another narrow white stripe, all of the long flat loosely set scales. Antennæ brown, verticels and pubescence brown, first joint short and somewhat distended, and clothed with a few flat brown scales, basal joint brown, heavily scaled with rather large flat loosely applied white scales; palpi brown with white tips, the scales being unusually long, and square ended; proboscis brown scaled; clypeus brown; eyes brown, and the shaggy appearance of the head makes them seem extremely small, so that instead of being the larger part of the head, they are quite insignificant.

Thorax dark brown; prothoracic lobes covered with large white flat scales, much like those on the head, and some brown bristles; mesonotum brown, covered with brown and white curved scales, those on the cephalic and median parts very slender, almost hair-like, those at the sides and towards the scutellum broader, a narrow line of white scales running cephalad from one wing joint to the other (an inverted "U"), a median line connecting with it at the cephalad end, and extending to the scutellum, two short lines from the scutellum cephalad; pleura brown, with heavy bunches of broad long flat white scales arranged in rows; scutellum brown, deeply trilobed with large long flat scales closely set on each lobe so that they appear tufted; metanotum rich brown, bare.

Abdomen brown, covered with brown scales, and narrow white basal bands on most of the segments, lacking on the first and last three segments, which latter, however, have narrow lateral white spots, the continuation of the ventral marking. The ventral marking is rather peculiar. The proximal segments being mostly white scaled, with only narrow brown apical bands, but the last three segments are largely brown scaled, a narrow white line starting at the median line of the base of the antepenultimate, running sharply laterad and then caudad, forming the lateral white spots of the three last segments noted above; apical brown hairs, apparently much more numerous on the antepenultimate segment.

Legs all brown, with more or less white at the bases; coxæ and trochanters testaceous with white scales; fore femora dark brown, a narrow white line on the ventral side extending from the base to near the apex, where there is a white spot on ventral and lateral aspect, not appearing on the dorsal aspect; tibiæ brown, a very narrow white band a little proximal of the middle, on the cephalic aspect; metatarsi and first tarsal joint basally light banded, second, third and fourth joints brown; mid femora light at the base, a distinct white spot about midway and an indistinct white spot interior to this, both on the cephalic aspect, also a brilliant white spot at the apex; tibiæ brown, with a white band about midway, metatarsi and 1st tarsal joints have white basal bands, the rest of the tarsi brown; hind femora brown, white at base and nearly two-thirds its length, and apex white (femora therefore mostly white); tibiæ brown, with median white band; metatarsi and first and second tarsal joints with heavy basal white bands, the last two joints pure white. The ungues on fore and mid legs, though equal and simple, are much heavier than are usually found on any mosquito of this size, the hind ones markedly smaller, but, having only one specimen, I have not dissected it, so that while fairly sure that it belongs to *Anisocheleomyia*, Theobald, it is impossible to state definitely the peculiar shape of the ungues. It is, I think, quite certain, however, in spite of the flat scales on head and scutellum, it is not a *Stegomyia*.

Wings clear, brown scaled, the scales very large, and of the Tæniorhynchus type, but a little inclined to asymmetry; cells short; 1st submarginal cell nearly a half longer and a little narrower than the 2nd posterior, the stem of the former about a third shorter than that of the latter; supernumerary and mid cross-veins equal and meet, posterior cross-vein also about the same length, and distant from the mid a little more than twice its own length; halteres light stem, with dark knob.

Length, 2.5 mm.

Habitat.—Camp Stotsenberg, Angeles, Pampanga, Luzon, P. I. Taken Sept.?

Described from one perfect specimen sent by Dr. Whitmore.

While the flat scales suggest *Stegomyia*, the general appearance of the insect is quite against it, the shaggy head bearing no resemblance to the neat appearance of *Stegomyia*. It is a small mosquito, and the scales on the head, scutellum and wing out of all proportion to the size of the insect, giving it a generally ragged look, so that though I have not been able to demonstrate the peculiar ungual features of *Anisocheleomyia*, I feel fairly sure it belongs to that genus.

Tæniorhynchus lineatopennis, n. sp.—♀. Head dark brown, with brassy yellow curved scales on median portion and extending from occiput to vertex, light bristles projecting forward, dark brown flat lateral scales, and a few forked scales, some light and some dark, on the occiput; antennæ dark brown, verticels dark brown, pubescence also dark, but appearing light in certain positions, basal joint brown; palpi dark brown, and quite hairy; proboscis dark brown; clypeus dark brown; eyes brown and silver.

Thorax: prothoracic lobes dark brown, with a few dark brown bristles, no scales; mesonotum dark brown, the median portion covered with dark brown curved scales bordered by a heavy band of brassy yellow curved scales, extending cephalad from one wing joint (inverted "U") across to the other, a very distinct and easily-recognized marking. The brown curved scales on the mesonotum near the scutellum appear in some lights white, and this seems characteristic of the brown scales all over the insect; pleura brown and clothed only with a few brown hairs; scutellum dark brown, with brassy yellow curved scales and a few light bristles; yellow bristles at the wing joint, and two sparsely-set rows on the mesonotum; metanotum dark brown.

Abdomen dark brown, with broad basal bands of "dirty white" scales hardly extending the full width of the terga; the first segment is dark, and the second has merely a median light spot, while on the ultimate segment the band is quite narrow; venter dark.

Legs are brown throughout; coxæ and trochanters and ventral side of femora somewhat lighter than the rest, a light spot near the apex of fore femora on dorsal side, *i. e.*, the ventral colour runs up, but all the scales show much change of colour in different lights; the tibiæ and more distal joints are darker, ranging from purplish to fawn colour, according to the angle of the light, and under hand lens may seem even brassy. All ungues simple and equal.

Wings clear, clothed with brown and light typical *Tæniorhynchus* scales. The costa is dark throughout, the subcosta and first longitudinal are mostly light scaled from the base of the wing to about the junction of the subcosta, and the stem of the fifth long vein is also light, with some light scales on the lower fork. The scales vary much in different lights, the colours ranging from a gray to "dirty white" to brassy yellow, and the effect is of two light diverging lines on the wing; fringe dark, turning gray in some lights; 1st submarginal is a fourth longer and a little narrower than the 2nd posterior; the supernumerary cross-vein about half as long as the mid, which it meets, and the posterior cross-vein about half as long as the mid, and distant twice its own length; halteres have a light stem and dark knob.

Length, 3.5 mm.

Habitat.—Camp Gregg, Bayambang, Pangasinan, Luzon, P. I. Taken Sept. 13, 14, marked "inside screens of screened house."

Described from two perfect specimens sent by Capt. Chamberlain, Surgeon, U. S. A.

This collection of Dr. Whitmore's is interesting in many ways, for all the specimens showed great care in preparation and extremely good differentiation. In only two boxes were there more than one kind, and the only badly broken specimens were in places where the insect had been caught in tying up the small pieces of tubes in gauze; one extremely small mosquito was so much denuded as to be quite impossible to place, but otherwise the collection was in remarkably good shape, and contained, besides the genera and species above described, the following previously known forms:

Finlaya poicilia, Theobald. "Bred from larvæ taken from banana trees."

Mansonia uniformis, Theobald. "Caught in the Quarters."

Mansonia annulifera, Theobald. "Caught in the woods, Hospital and Quarters."

Desvoidea obturbans, Walker. "Bred from large larvæ taken from under overhanging rock, in a deep pool of a clear running stream. Larvæ resemble overgrown Anophelina larvæ, and are very cannibalistic."

Desvoidea fusca, Theobald. "Bred from larvæ taken from the water-filled joints of bamboo poles in the fence."

Stegomyia scutellaris, Walk., var. *Samarensis*, Ludlow. "Caught in the woods and Quarters."

Stegomyia nivea, Ludlow. "Caught in the woods."

Stegomyia fasciata, Fabr. "Caught in the woods and Quarters."

Myzomyia funesta? Giles. Caught in the woods, Hospital and Quarters."

Myzomyia Rossii, Giles, var. *indefinita*, Ludlow. "Caught in woods, Hospital and Quarters." Very common.

Myzorhynchus barbirostris, Van der Wulp. "Caught in the woods, and rarely in the Quarters."

Myzorhynchus pseudobarbirostris, Ludlow. "Caught in the woods, and rarely in the Quarters."

Pyretophorus Philippinensis, Ludlow. "Caught in the woods, and rarely in the Quarters."

Culex gelidus, Theobald. "Caught in the Quarters."

Culex microannulatus, Theobald. "Caught in the woods."

Culex annulifera, Ludlow. "Caught in the woods."

So far as the taking of the Anophelina is concerned, Dr. Whitmore's experience is quite different from that of Dr. Chamberlain, Capt. Asst. Surg. U. S. A., at Bayambang, Pangasinan, who takes *Myzomyia funesta?* Giles; *Myzomyia Ludlowii*, Theob.; *Myzomyi Rossii*, var. *indefinita*, Lud.; *Myzomyia Rossii?* Giles; *Myzorhynchus vanus*, Walk.; *barbirostris*, Van der Wulp; *pseudobarbirostris*, Lud.; *Pyretophorus Philippinensis*, Lud.; and *Nyssorhynchus fulginosus*, Giles, in great numbers, both in and around the Quarters and Hospital, sending very suggestive collections of these from the bed nets of patients, while Dr. Whitmore apparently finds them mostly away from houses, *i. e.*, in woods and banana groves.

[ERRATA.—On page 94, line 6, for "a couple" read "some"; line 12, for "palpi two-jointed" read "palpi four-jointed, the first joint very short and the last minute"; page 97, line 4, for "white" read "light"; page 98, line 9 from bottom, change ";" after "legs" to ","; and page 100, last line but one, for "above" read "below."]

THREE NEW COCCIDÆ FROM COLORADO.

BY T. D. A. COCKERELL, BOULDER, COLO.

A series of tables for the identification of Rocky Mountain Coccidæ has been prepared for publication by the University of Colorado. Even now, while these tables await publication, I find myself obliged to add three new species, found here at Boulder; two of them representing genera new to our region. It is a rule of the University of Colorado publications that new species shall not appear for the first time therein, so I present herewith brief diagnoses of the three forms just mentioned.

Eriopeltis Coloradensis, n. sp.— ♀. Dark brown (colourless after boiling in liquor potassæ), forming a pure white ovisac 10 to 12 mm. long, of the form usual in the genus, compact, without any conspicuous filaments extending from its surface; antennæ and legs very minute; antennæ 8-jointed, joints 1 and 3 large but variable, 2 always very short, more than twice as broad as long, 4 to 7 all broader than long, 8 with several bristles; skin with truncate glandular spines as in *E. festucæ*, but they are not nearly so numerous, and seem generally shorter; anal plates much longer than broad. Length of mounted ♀ about 6 mm., breadth about 3.

On stems of grass, Boulder, Colorado, November, 1904. The exact locality of this and the *Trionymus* is the meadow in front of 930, 14th street.

Trionymus nanus, n. sp.— ♀. Very minute, elongated and rather parallel-sided, hardly 1½ mm. long, and about three-fifths mm. broad; very pale yellowish, antennæ and legs very light reddish, antennæ not extremely close together; secretion yellowish. Antennæ 7-jointed; tibia a little longer than tarsus. In potash the females turn light yellow.

Under a rock, presumably feeding on the underground parts of grass, Boulder, Colorado, Nov., 1904. Three found by W. P. Cockerell. The specimens evidently represent the early adult; after the eggs are formed they will no doubt be larger.

Orthezia olivacea, n. sp.— ♀. Length about 2½ mm., with cauda rather over 3 mm.; legs and antennæ reddish-brown. Body entirely covered with dense white secretion; dorsal line marked by a deep groove, with no median tufts; the two dorsal rows of lamellæ thick and obtuse, the first pair overlapping head, but not projecting far forwards; area between dorsal and lateral lamellæ covered by secretion; lateral lamellæ broad, the anterior three truncate, the others more pointed, the points curved inwards; caudal lamellæ surpassing last lateral ones, but not very long. Body denuded of lamellæ dark olivaceous. Antennæ (so far as seen) 7-jointed, joints 1, 2 and 3 subequal, but 2 the shorter; 4, 5, 6 shorter and subequal, but 5 somewhat the longer; 7 about as long as 4 + 5 + 6. Immature forms similar in appearance, but antennæ and legs rather light reddish, last joint of antennæ conspicuously darkened.

Boulder, Colorado, in nests of *Lasius* under rocks, Nov., 1904 (W. P. and T. D. A. Ckll.). Also found formerly in nests of *Lasius* at Trout Spring, New Mexico, April 27. The following measurements in μ are from the Trout Spring material: Antennal joints: (1) 96, (2) 78, (3) 90, (4) 48, (5) 48, (6) 39, (7) 129; knife-blade-like spine on the end of last joint 18 long; middle leg, tibia 225, tarsus (excluding claw) 195. Easily known from *O. lasiorum* by the colour of the body and the absence of the long tail in the immature forms.

PRACTICAL AND POPULAR ENTOMOLOGY.—No. 4.

Notes on Collecting, Preserving and Rearing Aquatic Hemiptera.

BY J. R. DE LA TORRE BUENO, NEW YORK.

I suppose that in due course I shall acquire much *los* and honour and not a little fame for harping in season and out of season to the tune of "Waterbugs." But I shall feel that my labours have not been in vain if by so doing I can induce others to launch themselves on the study of these forms, which are in many respects the most interesting and easily observed and collected of the Heteroptera. In these families much remains to be done. The classification is still more or less imperfect; new species are almost certain to be found and old and forgotten ones rediscovered; and the life-histories of all still remain to be worked out in detail.

The Waterbugs may roughly be divided into two sections: The Cryptocerata, in which the antennæ are nearly or quite concealed, which includes the families Corixidæ, Notonectidæ, Nepidæ, Belostomidæ, Naucoridæ and Gelastocoridæ, all of which, except the last, are swimmers and live in the water; and the Gymnocerata, which includes the Water-striders of the families Hydrometridæ, Gerridæ and Veliidæ, to which may be added the Acanthiidæ (=Saldidæ), all of which, except the last, walk or row themselves on the surface of the water.

Of course, the necessary apparatus for collecting consists of one or two suitable water-nets, cyanide bottles of several sizes, tight tin boxes for living specimens, and perhaps a pair of rubber boots for wading when necessary. The net I use is made of coarse Brussels net, so I am told, which is very strong and stands a good deal of rough usage, in addition to being very manageable when in the water. The size may vary to suit the individual preferences of the user. One about eight inches in diameter is very convenient, as it can be pushed into little nooks and crannies. The ring should be of rather heavy soft steel wire. Of course, any other approved net will do, but it must be strong enough not to come to pieces when it strikes a submerged branch or point of rock. The stick should be quite long—about five feet—to give a good reach. The cyanide bottles should be of several sizes; small ones for the delicate Velias, Hydrometra and the Acanthias; medium size for the Notonectas, larger Corixas, and Nepas; and quite large for the Belostomas, Ranatras and larger Water-striders. On no account should any aquatic bugs be killed in alcohol, as

in general it distorts and discolors them and seems to tend to make them greasy when they dry in the boxes.

Corixas are to be found in running streams, clinging to the bottom, and in quiet ponds, hiding among the vegetation. In the former situation, it is an easy matter to follow them with the net; in the latter, they are taken by *sweeping* the grasses and weeds, dragging the net through them. There are very many species of this genus, and they can be found abundantly wherever there is water, even though it be nothing more than a temporary pool. The Notonectidæ, Naucoridæ and Belostomidæ also can be taken by sweeping the vegetation at the edges of quiet waters. The first named family, however, can be captured by moving the net swiftly just below the surface when the bugs are seen there. They are more likely to be found close to the shore, and some species hide in the tangles of roots and grasses growing from them. The genus Buenoa (= Anisops) is generally to be found floating below the surface in clear spaces. *Pelocoris femoratus*, said to be our only Northern Naucorid, is found in great abundance when present, hiding in the water-weeds. The Belostomas, great and small, also seek similar situations, or else hide in the mud in rather deep water. Nepa and Ranatra require more particular treatment. The former is found in quite shallow water, not much over two or three inches deep, concealed in the mud, or else in situations where grasses grow out of the water, clinging together. Of course they must either be taken out with the mud and twigs and dead leaves, among which they lie hid, or else the grasses should be gone over several times with the net to disturb them and make them float into it. Ranatra, on the other hand, frequents deeper waters and clings to the stems of rushes and grasses that rear themselves into the air, thrusting its breathing tube through the surface. Here the net must be moved strongly back and forth a number of times among the stems. This repeated sweeping is necessary, as both these Waterbugs cling tightly to their supports and they are not readily dislodged. The semi-aquatic Gelastocoridæ wander in damp situations looking for their prey. They are ordinarily to be found in muddy or pebbly damp spots, generally on the banks of streams or ponds. The best way to catch them is to clap your net over them when you see them move, and then pick them out with your fingers to put them in the bottle. Acanthias can be found and captured in the same way. I always endeavour to put the mouth of the bottle over these, as they

will ordinarily jump right in, thus avoiding touching them, which is apt to damage these delicate little bugs.

Great care must be taken in handling the Cryptocerates, because they have sharp and powerful beaks, which they use with taste and discretion. They produce an extremely painful and lasting impression.

The Water-striders require different methods. These bugs walk or glide over the water as if it were a sheet of ice ; the smaller ones frequent floating water-lily leaves or the matted masses of duckweed, from which they sail out into the clear water on predatory excursions. Others, again, hide among the vegetation growing from the banks or among the stems of rushes or grasses, where the Marsh-treaders also lie low. One form loves the braiding ripples of streams, while others gather in multitudes on the calm surfaces of lakes, not far from the shores. The winged forms of all these should be diligently sought for and very carefully preserved. The Gerridæ in general afford much sport. They are wary and swift, and it is necessary to approach them very cautiously and then scoop them up with a sudden dash of the net, which should just brush the surface. The smaller ones are more apt to hug the shore than the larger, and they can be taken in a similar manner as they glide away. These may be headed off with the net also. Trepobates, Metrobates and Rheumatobates frequent the still waters of large ponds and lakes or the quiet parts of broad and slow streams. Rhagovelia is found in the swift streaks in streams, or in the eddies around rocks jutting into the air, zigzagging against the current. All occur in schools, and being extremely shy and quick in motions, must also be scooped up with a sudden dash. It should be borne in mind that the absence of wings may cause them to be mistaken for nymphs. Mesovelia and the Microvelias are to be found running about on the muddy, sloping banks of streams or still waters, or wandering over floating vegetation. I have found the best way to take them is to drive them to a clear space and there scoop them up with a small hand net. Hydrometra also frequents the shore vegetation of quiet, shallow ponds or marshes. These last bugs may sometimes be found in the net after sweeping it through rushes, but ordinarily they rush out from their shelters on being alarmed ; and, being rather slow of motion, they are best taken up singly with the fingers.

Now, as to methods of preservation. As before stated, alcohol is inadmissible as a killing medium, but there is nothing better for preserva-

tion for anatomical and histological purposes. The *dead* bugs should be put in about 75% alcohol, with some punctures made with a needle at the membranous parts and body-joints in order to allow the preservative fluid to enter the body-cavity, otherwise it will not penetrate and the "innards" will decay, bloating and distorting the specimens for any purpose. Formaldehyde, while an excellent preservative for tissues, according to my observation, hardens specimens too much and makes them too brittle. For the cabinet, they should be mounted while fresh, and in this way the Waterbugs preserve their natural colours much better. If this be not possible at the moment, they should be allowed to dry partially and put in layers in cotton, between sheets of soft tissue paper. The Velias, however, and in general, the smaller Water-striders should be put in alcohol, which, by keeping them flexible, preserves the antennæ and legs unbroken. The larger bugs should be pinned through the scutellum ; the smaller, including Plea, Buenoa, Hydrometra and the more minute Water-strider, are best mounted on points. Of course, the usual locality and date label should not be omitted, and it is also well to make field notes on habits, or the conditions under which the bugs were found.

One of the most interesting and profitable features of collecting Waterbugs is the excellent opportunity they offer for observation and study. As water is necessary for their comfortable existence, it is a simple matter to confine them in an aquarium and with care to preserve them to a hoary old age. For collecting the living insects, I have found nothing better than a dry tin box and in it enough excelsior, much pulled out and separated, to give the bugs something to cling to and to prevent them from coming together in a mass at one end of it, which is fatal. As they are air-breathers in all stages, water is not necessary in carrying from the field to the aquarium ; on the contrary, it is very harmful, and even excessive dampening of the excelsior in the box may have bad consequences. The best for the purpose are those soldered and hinged tin boxes in which fifty or one hundred cigarettes are packed. They are of a very convenient size to carry in the side pocket of a coat. Several should be carried when out collecting, in order not to be obliged to crowd too many bugs into one box. Belostomas should never be put in the same box with other bugs, because, being bigger and heavier, they are apt to hurt them. For the little Water-striders nothing is better than a small test tube lined with

blotting-paper and containing a few threads of excelsior and a little wad of it at the bottom.

The best aquaria are the ordinary round glass ones, or battery jars of different sizes. For the Water-striders, those giving quite an extensive surface of water are the best ; for the Cryptocerates, the water is better deep. Microvelias can be very well kept in jelly-glasses or any other of the thousand and one glasses or earthenware receptacles in which eatables are put up; the shallower and wider-mouthed they are, the better. All these aquaria must be covered with pieces of glass to keep dust from falling in and to prevent the water from evaporating and the bugs from escaping. The Velias should have Duckweed to rest on. The others should have some sort of vegetation in the water, partly to preserve it sweet, partly to give the swimmers something to cling to and on which to deposit their ova, should they breed. For food, flies (Musca) answer every purpose. It is better to feed them living or freshly caught, although the hungry bugs will feed on them even a day or two old. Just throw them in and the bugs will do the rest. ON NO ACCOUNT FEED THEM INSECTS KILLED IN THE CYANIDE BOTTLE. These are deadly. Nor is it safe to put Water-striders in the same aquarium with Notonectas, Nepa, Ranatra, Pelocoris or Belostomas of any kind. They do not last long under these conditions. Neither should Notonectas and Corixas be put together ; nor, in general, any bug with others smaller. The last will merely be a feast for the larger brethren. Even those of one species will destroy each other when driven to it by hunger.

The best times of the year to collect Aquatic Hemiptera are the Spring and Fall. As soon as the ice disappears from the ponds and lakes and streams, the larger Water-striders can be seen in abundance, the Corixas and Notonectas arouse themselves from their Winter's sleep, and Pelocoris, the Belostomas, Nepa and Ranatra leave their muddy Winter quarters and once more actively commence the real business of life—the propagation of their kind. From March until the end of May or the beginning of June, over-wintering adults of all the species may be found. After that, only the young abound, till August, when the season's brood of adults begins to appear. Collecting now continues good until the water gets too cold toward the end of Autumn. I have taken these families in this latitude as early as the middle of February and as late as the end of November. In the South, they are apparently obtainable at even later

dates, until in Arizona, California, and the Southwestern United States and thence South, they can be taken at all times of the year. One day is just as good as another for collecting. Sunshine and storm in no way affect the bugs, except those that walk on land (the Gelastocoridæ and Acanthiidæ), which seek shelter. When there has been but little rain and the ponds have evaporated to reduced areas, collecting is much better, as then the bugs are, so to say, more concentrated. After severe storms they are usually much scattered and less easily obtainable, because of the greater volume and area of their haunts. Yet even in these conditions, favourite nooks are found in which they fairly swarm.

In conclusion, I would say that this is merely the general outline of the methods that I have found useful, and I trust it will help others, as some such directions as these would have helped me when I commenced to collect aquatics. Each species requires slightly different methods; their haunts vary in character ever so slightly; the manipulation of the net has to be suited to the peculiarities of each. In the limited space at my disposal, it is impossible to give a cross between a check-list and a dissertation on habits, even were it desirable, which it is not. Therefore, each collector must observe closely to become expert. This is only the guide-post; the collector does the walking. If any of my readers would like further assistance, a letter to me will bring in return whatever may be in my power to give. (Address: 25 Broad Street, New York).

A NEW PEZOMACHUS FROM ITALY.

BY WILLIAM H. ASHMEAD, M. A., D. SC.

In a recent sending of parasitic Hymenoptera, bred by Dr. Filippo Silvestri, at the Laboratorio di Entomologia Agraria, Portici, Italy, sent me for names, I find a new Pezomachus, represented by both sexes.

Pezomachus Silvestrii, new species.—♀. Length, 2.6 mm.; ovipositor a little longer than the petiole of the abdomen. Black and shining, impunctate except a feeble shagreening on the pleura; the metathorax is rounded off posteriorly, and *without* a trace of a transverse carina; antennæ 21-jointed, the fourth joint a little shorter than the third, the flagellum brown-black, the extreme apex of the pedicel, or second joint of antennæ, yellowish; legs black, with the sutures of the trochanters, the apical third of front femora, front tibiæ narrowly at base and more or less beneath, and base of first joint of tarsi, testaceous, the rest of tarsi fuscous or brownish, but a little yellowish at sutures of the joints; hind tibial spurs white.

April, 1905.

♂.—Length, 2.5 mm. Black, not so shining as in the female, and finely shagreened; second joint of all trochanters, apex of front femora, front tibiæ, an annulus at base of middle and hind tibiæ, and all tarsi more or less, testaceous, the basal joints more or less yellowish at base and at their extreme tips; metathorax with delicate carinæ, indistinctly areolated. Wings subhyaline, a faint cloud in the region of the basal and transverse median nervures, and at the apical third of the wings, the large triangular stigma and the veins being brown, the parastigma and the extreme base of the stigma being white; the marginal cell is rather short, triangular, not longer than the stigma; the areolet is pentagonal in position, but open behind; the transverse median nervure in the hind wings is straight, but broken by a vein *below* its middle, or near its basal third.

Types.—Cat. No. 8262, U. S. N. M.

Hab.—Portici, Italy (Dr. Filippo Silvestri).

This species falls in Förster's Monographie der Gattung Pezomachus (Grv.), Sec. A., pp. 1–33, but is quite distinct, in colour and sculpture, from any of the species characterized in this work.

A NEW SPECIES OF XYLINA.

BY HENRY ENGEL, PITTSBURG, PA.

Xylina nigrescens. sp. nov.—Two males and one female.

Upper part of head and thorax stone-gray, front of head light brown, surmounted by a well-defined umber-brown line beneath base of antennæ. This line is continuous along lower margin of patagiæ and very contrasting from the gray thorax. The thorax is rather short and square. Thoracic vestiture intermixed with flattened hair. Thoracic crest slightly raised and defined by a patch of dark brown hair. Collar with a faint line near tip, not contrasting. Palpi are reddish-gray, strongly marked laterally with an umber-brown line outwardly. Antennæ brown, almost smooth in female, shortly ciliated in the male. The male antennæ are very little thicker than in the female, ciliations gray and contrasting. Basal part of antennæ covered with gray scales. Ground colour of primaries ash-gray. A faint tint of green noticeable in one male. The orbicular and posterior third of primaries show the gray colour. The rest of the wing is obscured by dense, glossy black. The basal dash is obvious, curved toward costa, marked with brown scales at the end. Basal part of costa deep black and basal line not visible. T. a. line faintly indicated, curved outward. T. p.

line contrasting from ground colour, curved outwardly, then lost in the black suffusion opposite lower end of reniform. The suffusion extends to costa between the ordinary spots. Posteriorly it encloses lower part of reniform and ends in a blunt spur nearly reaching to s. t. line. The s. t. line is indicated by brownish spots in the interspaces, best marked opposite cell and near submedian vein. A row of terminal black spots, clearly defined. Terminal space mottled with black, most pronounced near hind angle and opposite cell.

Fringe of primaries dark gray. Reniform almost square, clearly defined basally, marked with brown and black. Orbicular gray, faintly centered by a brown dash, strongly contrasting from the deep black, open to costa, intermediate space to costa concolorous with orbicular, somewhat broadening at costa. Claviform is indicated in all three examples by a feeble oblong ring, marked with a few gray scales in outer end. Abdomen gray, strongly tinged with carmine, most prominent on under side. Secondaries smoky, intensified along outer margin, terminus clear-cut, fringe gray, concolorous with base of secondaries. On under side primaries are strongly tinged with carmine along costa and outer margin, otherwise smoky-gray. Discal spot fairly evident, dark gray. Secondaries tinged all over with carmine, exterior line well marked, smoky. Discal spot dark gray.

Expands: 35–40 mm.

Habitat.—West Liberty, Allegheny Co., Pa., Oct. 25, Nov. 19 and Nov. 20, 1904. Taken at "sugar." Coll. Engel.

This species is allied to *querquera* and *viridipallens* in general habitus. These two species were compared. *Xylina Baileyi* is also closely allied to this group according to the description; I have only seen it in the figures given in the "Moth Book" and in the revision of the genus Xylina by Prof. John B. Smith. *Nigrescens* is at once removed from all the allied species by its primaries being intense iridescent black for two-thirds of the wing from the base. It is a most strikingly marked kind. With the wings folded and the gray thorax and apical part of the primaries strongly contrasting, it is easy to notice on the "sugar" patch under the glare of the lantern. A fourth example was taken by Mr. Merrick at New Brighton, Pa. Taking the constancy of these four specimens as a basis, I do not hesitate to give it a name.

PRELIMINARY LIST OF THE MACRO-LEPIDOPTERA OF ALBERTA, N.-W. T.

BY F. H. WOLLEY DOD, MILLARVILLE, ALTA., N.-W. T.

(Continued from page 60.)*

267. *Euxoa nesilens*, Smith (Jour. N. Y. Ent. Soc., XI., 192, Dec., 1903).—Described from Calgary and from Brandon, Man. The type is a Calgary specimen in Prof. Smith's collection, and a ♀ co-type is in my own. The description says: "In general appearance it resembles *silens*, but does not have the black basal streak, nor the blackish suffusion between the ordinary spots. On the other hand, it does have more complete, better marked median lines . . . Its distinctness is clear, and its association is with *basalis*, from which, however, it differs obviously in colour." The reference to *silens*, implied also in the name, should probably have been to *tristicula*, which at that time he looked upon as a synonym of *silens*. In general type of maculation its association may be with *basalis*, but at the same time it is not in the very least degree like it. It has the gray colour of *tristicula*, but unlike that species, has generally a distinct yellowish powdering. A good series of Calgary *tristicula* shows a tendency in that species to lose the black markings, and conversely, in a series of twelve *nesilens* there is a tendency to develop black before and between the stigmata, but no sign whatever of a basal streak. The yellowish powdering is not always evident, and though the transverse lines above referred to are a noticeable character in the series, they are not a reliable guide. As regards the basal streak, I may use *ochrogaster* for comparison. In none of my twenty-one examples of that species in series (1) *(vide infra)* is there any trace whatever of any of the black markings referred to, and all are obvious in the ten specimens under (1a). Yet I understand from Dr. Fletcher that both forms (1 and 1a) have been bred from the same female. I tried to call Prof. Smith's attention to *nesilens* as being distinct from *tristicula* (then known as *silens*) ten years ago, but shortly prior to its description proffered my doubts on the subject. I dare venture no definite opinion at present. Rare, at any rate of recent years. July and August.

268. *E. ochrogaster*, Gn. — Nearly always common, sometimes abundant, and the commonest "cutworm" in gardens. One of the most variable species known to me, some forms being decidedly handsome.

ERRATUM: On page 56, line 17 from the top, "No. 248" in the note on *E. pleuritica* should be "249."

Prof. Smith tells me that I have "every form of the species which has received a name." I divide the species into four series as follows, and have nothing that I can call an intergrade between any two of them:

1. Ground colour red. (*Ochrogaster*, Guen.).

1a. Ground colour red, with black basal streak, claviform and discoidal cell. (*Gularis*, Grote).

2. Ground colour ochreous.

2a. Ground colour ochreous, ditto as above. (*Turris*, Grote.)

Some of (2a) have a distinct darker central band, scarcely traceable in any of the other series. The variation in each series by itself, both in colour and maculation, is enormous. Form (1a) seems to be the least common. I never questioned the unity of the forms, perhaps taking it rather for granted that such a common and widely-distributed species must have been carefully bred long ago, but quite recently Prof. Smith wrote to me, "I am beginning to seriously doubt the identity of all the forms placed under the same name." Incidentally he expresses the same doubt concerning *perexcellens*. End June to September.

269. *E. Idahoensis*, Grt.
270. *E. furtivus*, Smith.
} Rather common at treacle some seasons, but rare of late years till 1904. End June to August.

I am fairly well satisfied that I have two closely-allied but distinct species, standing under the above names, and both Prof. Smith and Sir George Hampson confirm my belief that they are the two species indicated. I think I have them properly separated as species, but whether I have them under the right names or reversed is a more open question. I have had no opportunity of seeing the original descriptions, and in all other attempts to correctly place them I meet with confusion everywhere. Briefly described, my two series are as follows (I mention merely the distinctive features):

Idahoensis, eight ♂ ♂ and seven ♀ ♀. Pale reddish-brown or gray-brown, the darkest specimen having something of a purplish tinge. Costa, clear gray; collar of same, or nearly same colour as costa, with a black line. Discoidals uniformly concolorous with costa. A series of black sagittate dashes preceding s. t. line, in most of the specimens extending more than half way to t. p. line. In one specimen only there is scarcely a trace of these dashes.

Furtivus, fourteen ♂ ♂ and twenty ♀ ♀. A slightly shorter winged species. Costa gray, sometimes clear, but generally tinged with reddish-

brown, especially on extreme edge. Collar never as pale as costa, generally unicolorous with thorax, generally with a black line, but this is sometimes scarcely traceable. Discoidals outwardly of same colour as palest part of costa, but nearly always darker inwardly. In more than half the specimens there is a series of black sagittate dashes preceding the s. t. line, but only in one specimen do they extend more than half way to t. p. line. In the rest of the specimens these dashes are either entirely absent or discernible by a dusky shade only.

As a whole my *Idahoensis* is a slightly longer and narrower winged species, runs paler in colour, and when dark tends to purplish, sprinkled with gray, rather than to red-brown, and the s. t. dashes are more often present and then longer and sharper than in *furtivus*.

My *furtivus* is like Dr. Holland's fig., exactly, but short s. t. black dashes, not shown in that fig., are present as often as not. Sir George Hampson's description says of *Idahoensis:* "is dark reddish-brown, slightly irrorated with white," but mentions no s.t. black dashes. His fig. suggests my *Idahoensis* in colour, lacking the usual sharp s. t. dashes, but the discoidals seem darker centrally like my *furtivus*. He tells me "The type of *Idahoensis* is the gray form." His description of *furtivus* is "gray-brown or red-brown a series of small dentate black marks" (before s. t. line). His figure suggests my *furtivus*, but the discoidals are smaller than in any of my specimens of either species and the black s. t. dashes there shown are often wanting. He tells me "a specimen we have identified by Smith is the reddish form." As a matter of fact, in his descriptions, *Idahoensis* sounds the darker coloured species of the two, which, I take it, is incorrect. Prof. Smith says "both red and gray forms of each occur; *furtivus* has black sagittate spots before s. t. line; *Idahoensis* does not have these, though it may have a dusky shading." He also mentions a distinctive character in shape of orbicular, but this is so variable in both species that I find it valueless. Recently I sent him both species and he seemed misled, by the sagittate dashes, a supposed distinctive feature of *furtivus*, into taking my grayish form for his own species and telling me I had the names reversed, thus reversing his previous reference of my two forms. The species, for such I believe them to be, require placing on a firmer basis than they seem to have hitherto been.

271. *E. nordica*, Smith.—Described from two ♂ ♂ and two ♀ ♀ from Calgary and Olds, Alta. (B. C. in error). Olds is about 60 miles north of Calgary on the way to Edmonton. Its author states: "It is an ally of

divergens, and has the pale median vein; but the ordinary spots are not outlined in pale and are different in shape, opening on the pallid costa. This is also a much grayer species and the contrasts are more sharply marked. It has a little the appearance of *furtivus*, but the powdery markings and complete median lines easily distinguish it." The median vein is never as conspicuously pale as in most of my *divergens*, and it has not nearly so much resemblance to either this or *furtivus*, as the above remarks might lead one to suppose. Compare my notes under *pestula (supra)*. This is the commonest form of the group and is extremely variable in every particular. The most off-type specimen I have seen is briefly referred to under *servitus* (*q. v.*), July and August. Prof. Smith tells me that the type is from Cartwright, Man. I have a specimen from there which I believe to be *nordica*, but as the locality is not mentioned under the description, I think he must be mistaken, and that the type is a Calgary specimen. It is in the U. S. National Collection. I should never have recognized the species from Sir George Hampson's figure.

272. *E. divergens*, Walk.—Usually very common at treacle, and a pest at light. June and July. A ♀ in perfect condition on Sept. 8th, 1893, may possibly have been one of a second brood.

273. *E. redimicula*, Morr.—Common. July to middle Sept.

274. *E. servitus*, Smith.—The ♀ type (undated) is from Calgary, and was taken in 1895. It is figured in Ent. News, VI., Pl. xv. (December, 1895). I have never come across another specimen. The ♂ type, figured in Sir George Hampson's Catalogue, is from Colorado, and is in the U. S. National Museum at Washington, where the ♀ probably is also. I agree with Prof. Smith in thinking that this is really an aberration of *redimicula*. It looks like that species with the costal gray "smudged" from the base to the posterior end of the cell, obliterating the discoidal spots and the black in the cell except for a small black spot about its centre. I have a specimen of what I feel quite sure is *nordica* ♀ "smudged" in a similar manner, but without the black spot. This has been labelled *servitus* by Prof. Smith, which it most obviously is not. In addition to the smudge, this *nordica* gives the impression of all the colours having run together.

275. *E. tristicula*, Morr.—Common some seasons. June to middle Aug. Until quite recently Prof. Smith considered this to be *silens*, Grt., under which name it has for long been known in N. American collections. Shortly prior to the publication of his recent list he told me that the names referred to the same species, but he now finds that such is probably not

the case. Judging from the fig. of type in Sir George Hampson's Catalogue, I should say that the Calgary species is correctly named, but the ordinary markings are usually much more distinct. In October, 1903, I sent a pair of this species to Sir George Hampson as *silens*. He reported, "quite different from *silens*, Grt., of which we have the type; if it is not a form of *selenis*, Smith, it is a new species." He did not seem to associate it with *tristicula*, of which the type, from the Neumoegen collection, is in the Brooklyn Institute of Arts and Sciences.

276. *Arytus obscurus*, Smith.—Described from Calgary. The type, a ♂, is in the U.S. National Collection. Common at treacle some seasons, Aug. and Sept. Since the description was published, Prof. Smith has seen a series from here, and believes it to be a valid species, particularly as the genitalia differ from those of its ally. In the description he says: "This is undoubtedly distinct from *privatus*, all the inaculation being lost in the very deep ground, though retaining the characteristics of the eastern form so far as they are traceable." Grote never saw it, but affirmed that there was nothing in the description to separate it from the older species. Of the latter, I have only a single ♂ from New York, which, besides being larger, is very much paler. One of my Calgary ♂ ♂, quite the palest I ever saw, comes very near this specimen, and may be distinct from the rest of the series, though I doubt it. Unless the separation is to be by the genitalia alone, I am at a loss to discover how *profundus*, Smith, is to be distinguished from *obscurus*. The two are described on the same page, and *profundus* (type, from Brandon, Man.) figured on the accompanying plate, which *obscurus* is not. The specimen seems scarcely paler than the average run of Calgary *obscurus*, and I have specimens of what I certainly call *obscurus* from Cartwright, Man., sixty miles southeast of Brandon. Sir George Hampson's figures of the two species do not solve the difficulty.

277. *Fishia Yosemitæ*, Grt.—A few at treacle most seasons, but by no means common. September. About the last non-hibernating noctuid to come to treacle, and sometimes to be found resting on board fences in the daytime. This species has until recently been confused with *Hadena relecina*, Morr., under which name I have sent specimens out. It is probable that all Northwest records of *relecina* really refer to this species. Prof. Smith corrects the error in Trans. Am. Ent. Soc. XXIX., p. 201 (June, 1903), and states that *Yosemitæ* was wrongly referred to *Aporophila*. He mentions that two of his specimens are from British Columbia, and then says that one of those two is from Rounthwaite. The latter place

is near Brandon, Man., and I think scarcely less than 650 miles from the nearest point of B.C.

278. *Ufeus plicatus*, Grt.—A single ♂ taken in a house near mouth of Fish Creek, Sept. 9th, 1893, has been so named by Prof. Smith, but he says it is redder than his specimens.

279. *U. satyricus*, Grt.—Rather rare end Sept. to April. I have never met with this species except in houses, to which I have no reason to suppose that it has been attracted by light, even in the fall or spring.

280. *Agrotiphila incognita*, Smith.—Described from two ♂ ♂ from Laggan, Alta. (B. C. in error), July 22nd, 1890, Aug. 10th, 1891, above timber, 7,000 ft. (T. E. Bean). A ♀ taken by Mr. Bruce, in Colorado, is in the British Museum. The type is at Washington.

281. *A. maculata*, Smith—Described from two ♂ ♂ from Laggan, July 22nd, 1890, above timber, 7,000 ft. (Bean). I took a ♂ and three ♀ ♀ there on July 19th and 20th, 1904. One ♀ near the summit of Mt. Fairview, on the east side of Lake Louise, above 8,000 ft., and the rest on St. Piran, above Lake Agnes over 7,500 ft., all on the wing in sunshine, though probably disturbed by me. They were easy of capture. The ♂ was in good condition, the ♀ ♀ freshly emerged. Both this and the preceding species are figured on plates accompanying the descriptions. This species can be easily recognized from the figure, except that the secondaries as there shown are very much too pale. This fact is mentioned in the text. My specimens vary a good deal in the intensity of the black suffusions. The type is at Washington.

[NOTE.—Dr. Dyar's list of "The Lepidoptera of the Kootenai district of British Columbia" (Proc. U. S. Nat. Mus., XXVII., pages 779-938) has just come to hand and will be occasionally referred to by me as the "Kootenai list."]

282. *Mamestra discalis*, Grt.—Common. End June to early Aug. Have bred it from larva beaten from Salix in early spring. The form is slightly smaller and more distinctly marked than specimens that I have from Colorado.

283. *M. mystica*, Smith.—Described from Winnipeg. Not common, though it showed up in rather unusual numbers in 1904. July. Treacle. I used to consider this a dark *discalis*, and though I certainly believe it to be a distinct species, I must say the extremes very nearly meet. In some respects it is perhaps nearer *nimbosa*, but as of that species I have only a single and rather rubbed ♀ from New York, I will not risk comparison. In the description Prof. Smith says: "It is somewhat intermediate between

nimbosa and *imbrifera*, but distinct from both by the dark ashen gray of the primaries, as against the pale shading in *nimbosa*, and the luteous shading in *imbrifera*." The secondaries in *discalis* are almost pure white, in *mystica* rather dark smoky, and in *imbrifera* still darker luteous smoky. The palest *discalis* and the darkest *mystica* sometimes require comparison with a series to satisfactorily place. *Mystica* is a slightly broader winged species, and seems to have rather more acute apices, but in many species I find wing form just as subject to variation as some other characters. The claviform spot is a little larger, but the most obvious difference that I can see besides that of colour, is that the entire maculation in this species is more distinct. This feature in combination with the darker colour seems to obviate the suggestion of a colour variety. The type is at Washington.

284. *M. imbrifera*, Grt.—One ♂ at head of Pine Creek in 1894, by Mr. Hudson. I have the species from Assiniboia and Manitoba. It seems easily distinguishable from *discalis* or *mystica*, as Prof. Smith points out, by the luteous, almost olivaceous coloration throughout. In my three specimens (all ♂ ♂) the blackish shadings before the s. t. line are much more suffused and produced towards the t. p. than in any of my *mystica*. In each of the three last species there seems to be sometimes a tendency in the orbicular and reniform to join.

285. *M. purpurissata*, Grt.—Common. July and Aug. The discoidal spots are sometimes confluent.

286. *M. juncimacula*, Smith.—One ♂ at light, Aug. 12th, 1901, which Prof. Smith says is smaller than his specimens. It is below the average size of my *purpurissata*, but exceeds the smallest. A brief comparison of these two species with each other and with *nugatis*, Smith, will be found in Ent. News for December, 1898, p. 241. The joining of the discoidal spots, on which the name is based, is not a constant feature. My specimens show the following difference from *purpurissata*: Wings narrower, costa of primaries straighter, apex less rounded, colour paler, with more distinct reddish shade. Basal, t. a. and t. p. lines more sharply angulated, and s. t. line more sharply toothed inwards above the **W;** secondaries paler. The sharper angulation of the lines gives the primaries a reticulated appearance not noticeable in *purpurissata*. These differences are all well marked in Dr. Holland's figures of the two species, by which they should be easily separated. As a matter of fact the secondaries in my *juncimacula* are more smoky

outwardly than in his figure, and are scarcely darker than in some of my *purpurissata*.

287. *M. columbia*, Smith.—Originally described as a *Tæniocampa*, but referred by its describer to this genus in Trans. Am. Ent. Soc., XXIX., 199 (June, 1903). The types are in the Museum of the Brooklyn Institute of Arts and Sciences and in U. S. National Museum, and were taken by Capt. Geddes in 1884 in "North-west British Columbia." The locality thus vaguely recorded may in this instance be intended for Alberta, N.-W. T., where Capt. Geddes seems to have done a good deal of collecting, and where the species is rather common at treacle, and sometimes on flowers in the daytime, during July and August. Some years ago Prof. Smith named the species for me as *meditata*, under which name I suspect that it still stands in many collections, and of which it is, I suppose, the Western representative. I have compared a good series of both sexes from Calgary with 2 ♂ ♂ and a ♀ from Cartwright, Man., and with a series of *meditata* from Chicago and the extreme North-eastern States. The U. S. specimens run much darker in colour than our Western form, being dark reddish-brown, sprinkled with gray scales, *columbia*, as a rule, varying from a pale rusty yellow to an almost pinkish red. The three Manitoba specimens, however, which come from Cartwright, from Mr. Heath, though certainly *columbia*, rather than *meditata*, seem to suggest an intergrade.

288. *M. cervina*, Smith.—Described from Winnipeg, Man. The type is at Washington. Formerly confused with *lustralis*, under which name I used to send it out. The description states, "It is a narrower winged species, coming nearer to *meditata* in this respect and with less well pectinated antennæ. The markings, while much the same in all essential points, are less distinct." There also seems to be a difference in the genitalia. I have only one ♂ *lustralis*, coming from Dr. Barnes, locality not stated. Besides being paler, it differs in the points mentioned, except that I can see no antennal difference, even with a lens. Not rare. End June and July. Dr. Holland's figure of *lustralis* is *legitima*, Grt.

289. *M. segregata*, Smith.—Described from Laggan (B. C. in error). Taken at light, May 13th and 17th (T. E. Bean). Figured with the description.

290. *M. gussata*, Smith.— } Not rare at Sallow blossoms near mouth
291. *M. negussa*, Smith.— } of Fish Creek, Bow River, at end of April and early May. Both described from Calgary. Both are figured with the description, and a good figure of *negussa* is shown in Dr. Holland's

"Moth Book." The types of all the last three mentioned forms are at Washington. Whether they really represent three species is an open question. I can see nothing in the figure of *segregata* to separate it from Calgary *gussata*, and Sir George Hampson, who has both, as well as *negussa*, in the British Museum, or at any rate has seen the Laggan form and has the two others, considers *segregata* and *gussata* to be the same species. Not having seen the Laggan form personally, further comment upon it would be out of place. *Negussa*, which was described at my instigation, is practically *gussata* without the black or blackish markings present in that species as a basal streak, in the cell, before the s. t. line, and as a dash connecting t. a. and t. p. lines below the discoidal spots. The forms which when collecting them, I used to look upon as probably distinct, used to be not uncommon in the early spring in the above mentioned locality, but having changed my place of abode to ten miles further west, where I have never met with either, I have been unable to make special trips for them at the right season, and have not sufficient material to enable me to form anything like a decisive opinion. I have left 2 ♂ ♂ and 1 ♀ *gussata*, indifferent specimens, and 3 ♂ ♂ and 2 ♀ ♀ *negussa*, in almost perfect condition. *Negussa* looks to me a slightly broader winged species (?), in which the black is sometimes represented by dark chocolate brown, but seems very variable, and in some there is no trace of any dark markings whatever except in the reniform. I have a suspicion that a long series would show that the dark brown markings, when present, had a tendency to darken into black, which might make a separation of the forms very difficult. Prof. Smith's examination of the genitalia shows nothing against the suggestion. Dr. Dyar in his Kootenai list records *segregata* from Kaslo, B. C., and suggests that *gussata* is a variety of it.

292. *M. neoterica*, Smith.—Described from Winnipeg. Common, end June and early July. One specimen, in fine condition, on Aug. 4, 1893. The western representative of *detracta*. Prof. Smith says (Journ. N. Y. Ent. Soc., XI., No. 1, p. 16, March, 1903) "*neoterica* looks like a small *detracta* with some minor differences in type of maculation. When the genitalia of the ♂ ♂ are compared these differences are enormously increased, though there is no change in type." I have *detracta* from Louisiana, Mo.; Chicago; and New Brighton, Pa. In the Kootenai list, Dr. Dyar seems to imply that the western prairie *neoterica* is darker than eastern *detracta*. In my two series, though the colour difference is not strongly marked, the reverse is the case. *Detracta* is a little larger and has somewhat of a smoky suffusion throughout. *Neoterica* has a much

smoother appearance and shows more of a pale fawn ground colour, which seems generally obscured by the suffusion in *detracta*. I have only two ♀ ♀ of *neoterica*, all that seem to have been taken here in twelve seasons. These are both narrower in expanse than the average of the ♂ ♂. In *detracta* my ♀ ♀ average larger than the ♂ ♂. A glance at Dr. Holland's figures will give a good idea of the usual differences between the two forms. The type is at Washington.

293. *M. Farnhami*, Grt.—Not rare, at light and treacle. End May to early July.

294. *M. liquida*, Grt.—Common. End May to early July.

295. *M. Atlantica*, Grt.—Rare on the whole. June and July. Treacle. Not observed previous to 1896, and not met with every year since.

296. *M. radix*, Walk.—Common at treacle. June.

297. *M. Nevadæ*, Grt.—Rare. Treacle. June and July. In his Kootenai list Dr. Dyar says that a form occurring near Kaslo, B. C., is the same as the Calgary species, and suggests *Nevadæ* as the correct name, with *Canadensis*, Smith, as a probable synonym.

298. *M. invalida*, Smith.—Very rare. Four specimens only, all ♀ ♀. May 31st, 1902, June 18th and 19th, 1903. Method of capture not stated on labels, but probably light. Prof. Smith has one of the specimens. This, of course, differs from a *Hadena* in having hairy eyes, otherwise it has a strong superficial resemblance to certain gray forms of *Xylophasia versuta*, and might easily be mistaken for that species. It may best be distinguished from it by the presence of whitish or grayish white patches at base, in orbicular and claviform, and in s. t. space, especially near apex and anal angle. The secondaries are duller smoky, without any of the mother-of-pearl sheen which seems characteristic of *versuta*.

299. *M. trifolii*, Rott.—Common, end June to Aug., but absent in some seasons.

Var. *Oregonica*, Grt.—One specimen, a ♂, dated July 27th, 1898, is sharply distinct from the rest of my series. I had it for some years with *Scotogramma phoca*, to which I cannot help claiming that it bears more resemblance, but where I admit its presence never satisfied me. Dr. Barnes when viewing my collection in August, 1902., picked it out as this var. of *trifolii*. It is of the average expanse of *trifolii*, but actual measurement proves that my eye was correct in judging it to be broader in wing than any of that species I have examined. In colour it is dull luteous smoky throughout, and the maculation is very indistinct. The

median and t. p. lines seem more sharply lunulate inwards and toothed outwards than in *trifolii*, the s. t. line and terminal shade are hardly discernible, and the secondaries lack the pearly sheen of that species. By the hairy eyes it is certainly Mamestra rather than Scotogramma, but it was its dark luteous tint and smoky suffused maculation which made me place it tentatively with *phoca*. Prof. Smith has recently seen the specimen and, calling it *trifolii*, adds, "I can't say anything else, unless you prefer to label it *Oregonica*. In my series the primaries become almost black." It stands waiting for something like a connecting link. Dr. Dyar in recording a specimen of *Oregonica* in Mr. Cockle's collection at Kaslo, adds, "I am inclined to regard this form as distinct from *trifolii*" (Kootenai list).

300. *M. obesula*, Smith.—(Can. Ent., XXXVI, 151, June, 1904). Described from a ♂ and three ♀ ♀: one from Denver, Colo., the rest from here. The type is in Prof. Smith's collection at Rutgers College. Two pair, one a ♀ co-type, are in my own. Six specimens altogether have been taken, all at light, July 20th to Aug. 5th, 1903. The description says, "It is in a way intermediate between *Farnhami* and *trifolii*, having the colour contrasts of the former, with the build and maculation of the latter." I endorse those remarks, though before the description was published I had not noticed its resemblance to *Farnhami*, and had placed it next *trifolii*, than which, as its name implies, it is a stouter, heavier built insect, broader winged, and with less acute apices. It seems to be a well-marked species.

301. *M. rosea*, Harr.—Common. End May to early July.

302. *M. rubefacta*, Morr.—Very rare. Four or five specimens only. Middle June and early July.

303. *M. picta*, Harris.—A single specimen, ♂, on Aug. 16th, 1903, by Mr. Hudson. It is slightly smaller, but otherwise not separable from Chicago examples.

304. *M. assimilis*, Morr.—Not met with previous to 1896, when a few were taken. Since 1901 it has been rather common. End June and July.

305. *M. ingravis*, Smith.—Described from Calgary, and figured with the description. Fairly common at treacle and light, May and June. From what Prof. Smith says, this seems to have no very near allies in the genus. Some specimens show a decided tendency to melanism. The type is at Washington.

306. *M. adjuncta*, Bdv.—One specimen at treacle, June 28th, 1895 It has lost an abdomen, three wings and one antenna, during a journey through the mails.

307. *M. circumvadis*, Smith.—The type is a ♀, taken here at light on July 21st, 1900, and is in Prof. Smith's collection at Rutgers College. A ♂ on July 26th, 1902, is not quite such a fine specimen, and has lost both antennæ in a journey through the mails. Three or four specimens were taken at light during 1904, June 30th to July 13th. The species is recorded from Aweme, Man. (June 27th), by Mr. Norman Criddle. Prof. Smith says it is allied to *chartaria* and *defessa*. Sir George Hampson has seen a ♂ and says it is allied to *capsularis*, *minorata* and *ectrapela*.

308. *M. Tacoma*, Strk.—Fairly common some years. June to middle July. The species was described from Pullman, Wash., and Dr. Strecker adds, "Superficially having some resemblance to *lilacina* and *rugosa*, but agreeing in detail with neither." *Dodii* in the West was then standing in some collections as *rugosa* and may have been intended in Strecker's remarks. It is certainly more like *Tacoma* than is either Calgary *lilacina* or Ottawa *rugosa*, but I had *Tacoma* standing in a different series from *Dodii* five or six years before it had recognition as a species elsewhere. It averages larger than *Dodii*, and has the ground colour of a clearer lilac-gray, especially in the s. t. area. A nearly constant distinctive feature is that in *Dodii*, a reddish shade runs through s. t. space from the costa near the apex, obliquely towards where the t. p. line meets the inner margin. This is darkest above the subcostal vein and gradually fades out below it, generally vanishing completely ere it quite reaches the inner margin. It is not always present at all below subcostal vein, but there is very rarely any trace of it below the same point in *Tacoma*. In *Dodii* the orbicular varies tremendously in size, shape and colour. I have one specimen in which it is quite round, almost pure white, and hardly more than ¼ the size of the reniform. In others it is elliptical, irregular and ⅔ to ¾ the size. The orbicular in *Tacoma* varies much less, is more regular in outline, very slightly oval, more even in colour, and as clear or clearer than the palest part of s. t. area. As a whole the two species are sharply distinct, but occasional specimens require familiarity with the range of variation to determine.

(To be continued.)

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PRACTICAL AND POPULAR ENTOMOLOGY.—No 5.

CANADIAN THREE-COLOUR PROCESS ILLUSTRATIONS.

BY JAMES FLETCHER, OTTAWA.

We are indebted to the Toronto Engraving Company, Limited, for the beautiful plate given in this month's issue. The invention of the trichromatic photographic process of illustration is undoubtedly one of the most important stimuli to scientific work of recent years. Especially is this the case in the study of insects, where it is frequently necessary to depict accurately very slight differences, both in form and colour, which could be described only with difficulty, or at great length. The three-colour process makes it now possible to reproduce, with great exactness, any coloured object that may be desired, and at a moderate cost. As excellent examples of this kind of work in illustrating insects, we may refer to the many beautiful figures which have appeared in the pages of our esteemed contemporary "Entomological News," as well as those which have also adorned some of our own issues.

Up to the present time the best class of this work has all been done in the United States, but we are now able to present a plate done entirely in Canada by the Toronto Engraving Company, Limited, which, to the writer, seems to be equal to the best imported work. Anyone wishing to get full particulars as to cost, etc., should correspond directly with the above firm.

The insects figured on the accompanying plate were chosen with the special purpose of showing a wide range of colouring. The species are so well reproduced that there will be no trouble in recognizing all of them.

Figures 1 and 1a represent the Large Ermine, *Estigmene acræa*, Drury, female and male. This beautiful moth, which is common in all parts of Canada, is the perfect state of the so-called Salt-marsh Caterpillar, a name which was given to it many years ago by Dr. Harris, and of which an interesting account is given in his classic work on the Insects Injurious to Vegetation. The full-grown caterpillar is one of the common "woolly bears" and when full-grown is over an inch and a half in length. It is

extremely active and is clothed with long hairs, which are mostly of a blackish or reddish tint on the back, but of a lighter colour on the sides of the body. The colour of the skin is gray, marked on the sides with black spots and yellowish streaks. The female moth has all the wings of a beautiful silky white, dotted with black. The male shown at 1a is easily distinguished by its orange underwings. As an instance of the large amount of good work which is still to be done in entomology, it may be pointed out that, as far as the writer can learn, no complete life-history of this common and beautiful moth has ever been published.

Figure 2. The Two-lobed Plusia, *Autographa biloba*, Steph. The Plusias form a favourite group with all collectors of moths. They are active moths, for the most part beautifully marked with bold silver or gold marks on the forewings, contrasting with a brown or bronzed background. The caterpillars of many of the species have not yet been described, but they are interesting from the fact that they are semi-loopers, having only two pairs of prolegs on the abdominal segments, instead of four pairs as in most noctuid caterpillars. The food plants of most of the species in the group to which the Two-lobed Plusia belongs, are various low herbaceous plants. The caterpillars are of a delicate green colour, closely resembling the hue of the plant upon which they feed.

Figure 3. The Large American Tiger Moth, *Arctia caia*, L., a. *Americana*, Harr. There are few more striking insects than the beautiful large tiger moth which is shown herewith. In some specimens the large black spots shaded with blue on the underwings are very much larger and more numerous than in our figure ; likewise, in some specimens the white markings on the primaries may be more conspicuous or almost obliterated. The caterpillar, which has been described fully by Mr. Arthur Gibson in the "Canadian Entomologist" for November, 1900, is two inches in length, of a deep black above, rust-red on the sides, and covered with long, sweeping black and silvery hairs. The eggs are laid in summer, the caterpillars make about half their growth before winter sets in and become full-grown in June, the moths appearing a month later.

Figure 4, the Cerise Underwing, *Catocala concumbens.*, Wlk. The Underwings are a very large and favourite group with collectors. The present species is, perhaps, one of the most attractive and is a common moth in Eastern Canada. The caterpillar feeds on willow.

Figure 5, the Nepigon Forester, *Parasemia plantaginis*, L., b. *Scudderi*, Pack. The form here shown is the extremely constant and invariable one which may be taken in hundreds at Nepigon, north of Lake Superior. This was described by Henry Edwards as *Nemeophila Selwynii;* but, as Mr. H. H. Lyman has pointed out, it is most probably the same insect as was described by Packard under the name of *N. Scudderi.* The stem-species *P. plantaginis* is remarkable for its extreme variability, as may be seen in a large series of specimens taken at any place in the foothills of the Rocky Mountains; but the Nepigon form is remarkably constant in all its markings; and, although an occasional specimen taken in the West may resemble the Nepigon form very much, there is always one small but seemingly good character by which the specimens may be separated, viz.: a short orange stripe at the base and extending about one-fifth of the length up the edge of the costa. This has always been entirely wanting on all specimens which I have taken at Nepigon (some hundreds) or have bred from the egg.

Figure 6 and 6a, the "White Pine Butterfly" (of British Columbia), *Neophasia menapia*, Felder. Periodically the Douglas Spruces in the coast regions of British Columbia, and the Bull Pines, *Pinus ponderosa*, of the interior of that province, are severely injured by the white-striped, dark green caterpillars of the beautiful Pierid here illustrated (female, upper and lower side). The male butterfly is much whiter and does not show the rich markings on the veins. The eggs are most beautiful objects, resembling minute emerald green Florence flasks, vertically lined with delicate lines and with a beaded rim of porcelain-white knobs. The eggs are laid in rows of from five to fifteen along the leaves, at an angle pointing to the tip of the leaf, and cemented together. Eggs laid in the Okanagan Valley of British Columbia at the end of July remained as eggs all through the winter and hatched from the 5th to the 12th April the following spring at Ottawa and in West Virginia. In some seasons, as last year, this butterfly is enormously abundant in British Columbia during August, and the dead insects may be seen in myriads, floating on the sea around Vancouver Island. The females are always remarkably less abundant than the males.

Figure 7 represents the common noctuid, *Noctua bicarnea*, Gn. This figure is not so successful as the others on the plate, the markings being less distinct than might have been expected from the specimen.

A NEW CARABUS AND CYCHRUS, WITH MISCELLANEOUS NOTES ON COLEOPTERA.

BY THOS. L. CASEY, ST. LOUIS, MO.

Among a large series of Coleoptera collected by Mr. C. H. T. Townsend in the northwestern part of Mexico and forwarded to me some years ago, I note an interesting new *Carabus*, which may be described as follows :—

Carabus Townsendi, n. sp.—Somewhat similar to *Forreri*, Bates—Ann. & Mag., N. Hist, ser. 5, IX., p. 320—from Durango, but narrower in form, the elytra having similarly close-set unimpressed series of very minute punctures, but having each only two series of larger, widely-spaced, impressed foveæ, the inner of the three series of *Forreri* being wholly absolete, the middle series only present in basal half and the outer extending only to apical fourth, the lateral margin more narrowly reflexed and with bluish reflection. Length, 21 mm.; width, 9 mm.

The single specimen in my cabinet was taken at Meadow Valley, six miles south of Colonia Garcia, Chihuahua, Mexico, in the Sierra Madre Mountains, at an elevation of 7,300 feet.

Cychrus pustulosus, n. sp.—Black, dull in lustre, with shining elytral tubercles ; head coarsely punctato-rugose, with well-marked supra-orbital ridges, the front but feebly elevated at the middle ; prothorax rather wider than long, the sides broadly rounded anteriorly, becoming oblique and nearly straight toward the base as in *Hemphilli*, the angles obtuse, the surface coarsely punctato-rugose and dull, the margins very finely reflexed; elytra oval, having each three series of large, widely-spaced, rounded and polished tubercles, increasing in size to the summit of the declivity and even more conspicuous than in *tuberculatus*, though less numerous, the intervening surfaces with single series of small tubercles, the interspaces also minutely and irregularly tuberculose or granulose, dull and lustreless. Length, 17 mm.; width, 8 mm. Washington State.

The single female before me differs from *tuberculatus*, not only in its oblique sides of the prothorax toward base, but in its smaller size, less robust form and stronger elytral tubercles. The prothorax of *Hemphilli*, *Rickseckeri* and *pustulosus* is oblique and nearly straight at the sides toward base, while in *tuberculatus* the sides are broadly sinuate posteriorly, the basal angles being right.

The European *Cryptophilus integer*, Heer., seems to be cosmopolitan in distribution, and, although unknown to me at the time of revising our

Cryptophagidæ (Journ. N. Y. Ent. Soc., VIII), I have since obtained single specimens from Vicksburg, Miss., Alexandria, La., and Del Rio, Texas.

In my revision of the American Coccinellidæ (l. c., VII) I erected a new genus—*Neomysia*—for the species of our fauna usually called *Mysia*, and, although I am now inclined to think that there is really no generic difference between our species and the European, the name *Neomysia* will, nevertheless, have to be applied to both, as *Mysia* is a preoccupied name. In the genus *Zagloba* (l. c., p. 113), the two forms described under the names *laticollis* and *orbipennis* seem to be merely varietal in nature, although the material in my cabinet is too scanty to base any final judgment upon. As stated by Mr. Fall, my *Exochomus ovoideus* (p. 107) should be regarded as a synonym of *desertorum;* the locality label on the former specimens is undoubtedly erroneous; they may have been taken in Colorado, in which region much of Dr. Levette's material was collected. *Nephaspis brunnea* seems to be the female of *Gorhami* (p. 168), and the name should therefore disappear in synonmy. It is my desire, in the near future, to revise again our species of *Scymnus*, as the table published in the paper mentioned is far from satisfactory in many respects.

Liobaulius spectans, Csy., described in the preceding volume of this journal, is closely allied to the Central American *Anthicus clavicornis*, Champ., differing principally in having the elytra punctate only in the transverse subbasal depression and not striato-punctate in basal third. *Impressipennis*, Laf., described from Texas, which also appears to be allied, differs in coloration and in its much more elongate elytra. No species closely allied to *Fronteralis* is alluded to by Mr. Champion in the "Biologia."

Vanonus, Csy.

Renewed observation upon the material in my collection seems to prove that those examples having the under surface of the hind femora densely papillose and the antennæ evenly and gradually enlarged distally, are males, while those without the femoral pad, but with a strong subapical lamelliform tooth on the under side of the hind femora—the antennæ having an abrupt pentamerous club—are females. It may be said, at least, that where the male spicule is visible at all, the femora are papillose, and, in the only case before me where the sex is evidently female, the femora are simply toothed. In my previous work (Col. Not., VI:, p. 791,) I took it for granted, to some extent, that the remarkable

femoral tooth and abnormal antennal characters bespoke the male, and was therefore led to make a distinct genus for these females named *Tanilotes* (l. c., p. 798). Suppressing the genus *Tanilotes*, therefore, we may suggest the following arrangement for the rather numerous species of *Vanonus*:—

Vestiture simple and uniform, short, rather stiff and not conspicuous.... 2

Vestiture dual, consisting of larger, suberect and stiffer hairs, borne by the punctures, and very small, fine decumbent and denser hairs covering the interspaces; eyes generally very large, the body always small in size, less than 1.5 mm. in length; basal impressions of the pronotum large but shallow, always separated.....9

2. Two subbasal impressions of the pronotum confluent transversely....3

Two subbasal impressions separated.....8

3. Subbasal impression of the pronotum feeble, especially at the middle; species much larger, nearly 2.5 mm. in length, rather sparsely punctured, brown in colour, the head darker. Wisconsin.....*calvescens*, Csy.

Subbasal impression deep and conspicuous throughout its extent; species minute, scarcely ever exceeding 1.5 mm. in length.....4

4. Prothorax as long as wide, or nearly so, the sides oblique and nearly straight anteriorly.....5

Prothorax transverse.....6

5. Eyes moderately large, separated by scarcely more than twice their own width; occiput but slightly elevated, blackish-piceous in colour, the antennæ and legs red-brown; elytra feebly elevated internally near the scutellum. Pennsylvania (near Philadelphia)....*piceus*, Lec.

Eyes smaller, separated by much more than twice their own width, the front flatter and the occiput more elevated when viewed laterally, slightly smaller in size, black or blackish in colour; elytra more strongly and abruptly subtuberculate inwardly near the humeri. Ontario (Severn).....*tuberculifer*, Ham.

6. Eyes large, separated by much less than twice their own width; antennæ thick, gradually incrassate; prothorax small, subparallel toward base, narrowed apically, dark piceous-brown throughout. New York, (Hudson Valley).....*vigilans*, Csy.

Eyes much smaller, separated by distinctly more than twice their own width; prothorax strongly, almost evenly rounded at the sides and but slightly more narrowed apically than basally.....7

7. Pale brown, the head piceous, moderately stout and convex; head intermediate in width between the prothorax and base of the elytra,

finely punctured ; antennæ about half as long as the body, rather slender, enlarging moderately toward tip ; prothorax finely but strongly, closely punctured ; elytra parallel, about two-thirds longer than wide, the punctures strong and rather sparse, the surface strongly shining, each broadly but rather abruptly swollen near the scutellum. Length, 1.4 mm.; width, 0.75 mm. New York, (near the city) *fusciceps*, n. sp.

Darker brown, the head blackish ; integuments much duller in lustre, the punctures denser, those of the elytra smaller, but more close-set ; antennæ almost similar ; prothorax relatively larger, strongly rounded at the sides, slightly narrower than the head ; elytra rather more elongate and less subtruncate at apex, the swellings near the scutellum feebler and more diffuse. Length, 1.5 mm.; width, 0.7 mm. Wisconsin (Bayfield). Mr. Wickham..... *congener*, n. sp.

8. Eyes small, moderately prominent, the tempora behind them larger than in any other species of the genus, and from more than one-half to two-thirds as long as the eyes ; front broadly convex, closely punctate in the male, sparsely in the female ; male antennæ about half as long as the body, the five outer joints very faintly larger, those of the female two-fifths as long as the body, with the five outer joints more distinctly enlarged ; prothorax densely punctate, wider than long, only slightly narrower than the head, narrowed anteriorly ; elytra parallel, obtusely rounded at tip, finely, strongly and closely punctured, more elongate in the male and about three-fourths longer than wide ; size small as in *piceus*. Wisconsin (Bayfield). Mr. Wickham. [= *Tanilotes lacustris*, Csy.]..... *Wickhami*, Csy.

Eyes larger, almost attaining the base ; size much larger, about 2 mm. in length, similarly blackish in coloration and only moderately shining, strongly and closely punctured; antennæ barely two fifths as long as the body, the five-jointed club very broad and conspicuous ; elytra parallel, nearly twice as long as wide, obtuse at apex ; femoral tooth of the female much larger than in *Wickhami*. Pennsylvania (near Philadelphia)..... *densus*, Csy.

9. Eyes separated by distinctly more than their own width ; antennæ shorter, two-fifths as long as the body, gradually but strongly incrassate distally ; elytral punctures coarser and less dense, the surface somewhat shining. Florida (Crescent City)..... *Floridanus*, Csy.

Eyes separated by not more than their own width and sometimes less; elytral punctures smaller, dense, the surface very dull ; antennæ much longer, fully one-half as long as the body..... 10

10. Basal thoracic impressions distinct ; form stouter, nearly as in *piceus;* antennæ thick, rather more than half as long as the body, only just

visibly incrassate throughout their length, pale ; body piceous-black, the legs slender, dark brown throughout. Michigan...*Huronicus*, Csy.

Basal thoracic impressions very feeble ; body smaller and slender ; antennæ thinner but more obviously incrassate from base to apex, black, the antennæ and legs pale, the femora blackish. Florida (Indian River)*sagax*, Csy.

The types as described above are males throughout, having padded femora, except *densus*, of which the only known representative is a female. The key to the interpretation of sexual identity here assumed was fortunately given by the two specimens of *Wickhami* before me, and it is regrettable that a greater number of individuals are not known in other species, in order to verify or modify the conclusions arrived at from this pair. The sexual differences certainly appear to have developed a most unusual form, since femoral modifications of the kind noted in the assumed females of *Vanonus* almost invariably pertain to the male. The types of *congener* and *fusciceps*, following my original hypothesis, were the females of other species of the *piceus* group, but, upon the theory that all the individuals with padded femora are males, they could be considered in no other light than distinct species.

The generic name *Schizonotus* (Col. Not., IV., 1892, p. 708) is several times preoccupied, and I would therefore substitute *Schizomicrus*. The genus *Pseudolesteva*, Csy., (l. c., V., p. 398) is also preoccupied, and I would therefore substitute for it the name *Paralesteva*.

A copy of the "Index Zoologicus," of Waterhouse and Sharp, just received, forms a very useful addition to the library, although marred by a considerable percentage of error. Referring to my own genera, for example, I find the genus "Achromata," attributed to me, should be *Achromota*, and, in a similar way, the genus "Megafaronus" should be *Megarafonus*. "Olia" should be *Olla*, "Pontalomata" should be *Pontomalota* and "Ulloporus" should be *Uloporus*. The genus "Eomedon," similarly assigned, was not described by me. *Eulitrus*, "Casey," should be *Eulitrus*, Sharp. I do not recollect having founded any such genera as "Sponidium" and "Typitium," which are attributed to me, and further verification is necessary. The genus *Tyloderma*, Say, seems to have been overlooked in all the lists that I have been able to consult ; it is an important genus of Curculionidæ. The names *Delius*, *Isoglossa*, *Orus* and *Phalacropsis*, proposed by me, have been repeated by other authors, and, as these genera appear to be valid, the latter names will have to be changed. The name *Ditaphrus*, Csy., repeated later by Sharp, is, however, a synonym, and Sharp's name will therefore remain valid, unless it be considered better to have no two names alike, even though one of them may be a synonym, which in the writer's opinion is the preferable policy regarding genera, although unnecessary in the case of species.

NEW SPECIES OF COLEOPTERA FROM THE WESTERN UNITED STATES.

SECOND PAPER.

BY H. F. WICKHAM, IOWA CITY, IOWA.

A number of interesting undescribed species of Coleoptera have accumulated in my cabinet, principally as the result of my own trips to the western parts of the country. The description of several of these follow, care having been taken to avoid describing forms belonging to genera of great extent which have not been recently monographed :

CICINDELA, Linn.

C. Parowana, n. sp.—General form of *C. fulgida*, Say, but a trifle more elongate. Above bright, shining blue-green, beneath purple-blue. Head granulate above, interocular striæ fine and numerous, front very hairy, cheeks with a few white hairs, labial palpi of male pale at base, labrum longer and more advanced in the middle than in *fulgida*. Prothorax much as in *fulgida*, but more narrowed behind and less hairy. Elytra proportionately a little longer and more finely and clearly punctate than in *fulgida*, the surface very finely rugulose, the tips minutely serrulate. Markings of the type of *fulgida*, but the middle band is prolonged backward along the side margin, though not reaching the apical lunule, while the descending discal portion is more elongate, less curved, scarcely enlarged nor reflexed at tip. Vestiture of the under surface much as in *fulgida*. Length, 13 mm., .52 inch.

I collected a small series of this interesting beetle on the old sand beaches of Little Salt Lake, near Parowan, Utah, about the middle of August. They were running and flying at a distance of perhaps half a mile from the water's edge on bare spots among the scant grass and weeds which dot the waste bottoms. As I was engaged at the time in a search for *C. echo*,* I thought at first that I had secured a green race of that species which would lead into *C. pseudosenilis*, and not until after reaching home did I find that my captures were more nearly allied to *C. fulgida*. I succeeded also in finding the true *C. echo* in this same neighbourhood, though it was more abundant closer to the lake.

After a casual comparison with specimens in my cabinet, my first impression was that the above-described form should be classified as a local colour-variety of *C. fulgida*, but on further examination I have

*See The American Naturalist for September, 1904; also the Annual Report of the Entomological Society of Ontario for the same year.

decided to let it stand for the present as a species which should go between *fulgida* and *echo* (though more closely allied to the former), since the characters used in diagnosis seems absolutely constant in my series. The backward extension of the marginal portion of the median band, unaccompanied as it is by any tendency to forward expansion, is a striking character, though not in itself of any great taxonomic value.

Scymnus, Kug.

S. virginalis, n. sp.—Form broadly oval, convex, outline of thorax and elytra nearly continuous. Beneath testaceous, the femora more or less piceous, above black, anterior angles of the prothorax indefinitely paler, each elytron with a large oval spot (most of which is antemedian), and a triangular lateral mark, broadest on the base and gradually narrowing posteriorly, orange-red. Head extremely sparsely and minutely punctured. Prothorax sparsely and finely punctured, narrower at apex, broadest in front of the middle, sides arcuate anteriorly, more nearly straight behind, basal margin not regularly curved, but sub-sinuate laterally and truncate in front of the scutellum, the marginal line visible, but not well marked. Scutellum finely punctured. Elytra more deeply and coarsely punctured than the prothorax, the surface (when denuded of pubescence), shining. Prosternum with the elevated ridges subparallel. Mesosternum punctate and rugulose, metasternum more coarsely punctured at sides. Abdomen not closely nor coarsely punctured, the metacoxal arc covering only about half the width of the first abdominal segment and not attaining the outer anterior segmental angle. Length, 2.85 mm., .114 inch.

Found at Leeds, St. George and Chadburn's Ranch, all in the Virgin River basin, of southern Utah. I took a number of specimens of this fine large species, in July, and they show considerable variation in coloration. The pattern described above is that of the type, and seems to be the most characteristic; some individuals, however, have the reddish elytral spot confluent anteriorly with the latero-basal mark, so that only the sutural region and a large apical blotch remain black. The head, in one specimen, becomes reddish, and in this individual there is also a narrow transverse reddish stripe on the prothorax. The extent of the prothoracic pale margin is somewhat variable, and the abdomen is occasionally clouded along the middle. The pubescence, above and beneath, is whitish, not concealing the surface colour. By Dr. Horn's synopsis, this species belongs next to *cinctus*, Lec., and it seems certainly different from any of those described later by Major Casey.

GVASCUTUS, LeConte.

G. juniperinus, n. sp.—General form of *G. obliteratus*, Lec. Colour metallic-purplish, shining, surface obscured by a greenish-yellow pollinose deposit, which becomes whitish on the sterna and venter, the entire body and legs clothed as well with a fine, sparse, short white pubescence. Head coarsely, unevenly and confluently punctured, epistoma broadly emarginate. Eyes much less oblique than in *G. planicosta* and *G. obliteratus*, so that the face between them, viewed from in front, is about as broad at top as below. Antennæ short, not or scarcely attaining the posterior thoracic angles, the second joint proportionately shorter and thicker than in the female of *G. obliteratus*. Pronotum about two-thirds as long as wide, convex, irregularly coarsely punctate, the punctuation extensively confluent at the sides and anterior margin. A broad median space is simply irregularly punctate, the punctures well separated. Sides arcuate anteriorly, nearly straight and almost parallel in posterior three-fifths. Base emarginate at middle, sinuate each side; apex slightly rounding. Hind angles acute, scarcely perceptibly divergent, front angles obtuse. Elytra, across the humeri, slightly wider than the base of the prothorax, scarcely perceptibly narrowed to about three-fifths, thence rapidly to apex, which is emarginate or shortly spinose, side margin serrate near the tip, surface with small, irregular smooth spaces and rather finely punctured, the punctures somewhat regularly serially arranged near the suture, but confused near the sides and tip, where they become extensively (especially transversely) confluent, giving rise to a rugose structure. Prothorax beneath rather coarsely, deeply and confluently punctured, the prosternum between the coxæ smooth, highly polished, not sulcate, but with a longitudinal row of pitlike punctures. Meso- and metathoracic sidepieces coarsely and confluently punctate, sterna sulcate, smoother near the middle where the punctures become sparser, but deeper. Abdomen rather coarsely rugosely punctured at sides, middle alutaceous between the punctures, which are coarse, but generally well separated. Last ventral subtruncate and somewhat uneven at tip. Legs alutaceous and distinctly strongly punctured to the tips of the tibiæ. Femora and tibiæ simple, the anterior tibiæ very slightly arcuate, the middle and hind ones practically straight. First joint of hind tarsi as long as the second and third united, claws simple. Length, 11.75 to 13 mm., .47 to .52 inch.

Described from three specimens which I beat from Juniper, July 22, on Chadburn's Ranch, in the foothills of the Pine Valley Mountains, at an

altitude of about 4,500 feet. This locality is in Southern Utah, about twenty-two miles from St. George, on the road between that place and Modena. The species is abundantly different from *G. obliteratus* by its smaller size, different colour and sculpture, shape of the head and structure of the antennæ. From *G. planicosta* it differs not only by the above characters, but also in lacking raised elytral costæ. *G. cuneatus* is described as being larger (.75 inch. = 18 mm.), of different colour and with truncate epistoma. The food habit of this species is noteworthy, *G. obliteratus* being found on several species of desert shrubs, while *G. planicosta* frequents especially the bushes of *Larræa Mexicana*. Although *G. obliteratus* was rather abundant at St. George throughout July, I did not see it in the neighbourhood of the ranch at all.

HYDNOCERA, Newman.

H. Knausii, n. sp.—Form moderately elongate, not notably convex. Testaceous; legs and antennæ yellowish, eyes, metasternum (excepting the side pieces), abdomen, scutellum and elytral bands black, the tibiæ near the base and the middle of the hind femora more or less infuscate. Surface with rather long, sparse, whitish pubescence. Head (with the prominent eyes) about one-fourth wider than the prothorax, front intricately rugose, antennæ shorter than the head, first and second joints large and stout, third a little longer than the fourth, club regularly ellipsoidal pointed at the tip. Prothorax rugose, about one-fourth broader than long, widest in front of the middle, where the sides are gibbous, thence nearly parallel to the base, which is strongly beaded. Elytra about one-fourth wider than the prothorax and nearly twice as long as broad, subparallel, slightly narrower and dehiscent behind, humeri prominent, surface alutaceous, coarsely, closely and deeply but regularly punctured, the punctures becoming so large near the apex as to give rise to a reticulate appearance. In colour they are reddish, each with the posterior two-fifths and a submedian band black, the interspace bearing a transverse patch of more conspicuous silvery hairs. Margins coarsely serrate posteriorly. Beneath, the thoracic sidepieces are rugose. Legs with long, sparse, bristly hairs. Length, 3.25 mm., .13 inch.

The type was given me by Mr. Warren Knaus, who took it at McPherson, Kansas, September 30. It is quite different from any of the described North American species, and in view of the successful attention bestowed on the fauna of Kansas by Mr. Knaus, I have dedicated this pretty insect to him.

APHODIUS, Illiger.

A. Kansanus, n. sp.—Moderately robust, broader behind, convex. Colour, pale yellowish testaceous, shining, head more reddish, prothorax with irregular dark discal cloud, elytra maculate. Head without tubercles, alutaceous, finely and sparsely punctate, clypeus with broad, shallow emargination, edge slightly reflexed, without denticles, angles rounded, genæ moderately prominent, and bearing a few long bristles. Antennæ pale yellow. Prothorax broad, widest in front of the middle, sides fimbriate, arcuate, narrowing to the base, which is not regularly rounded, but more produced at middle, marginal line distinct, rather deep in some of the specimens; disk convex, finely alutaceous, the punctures somewhat larger than those of the head, sparsely placed, almost wanting near the hind angles. Elytra at base about equal to the prothorax, broader posteriorly, finely alutaceous, striæ rather fine and shallow, impunctate, intervals nearly flat, with a row of extremely fine serial punctures. Body beneath, smooth and shining, a few setigerous punctures on the thoracic segments and a row on the anterior edge of each segment of the abdomen, the last ventral with scattered setæ over the entire surface. Mesosternum opaque, not carinate. Legs moderately slender, anterior tibiæ smooth on their outer faces, tridentate, apical tooth normal, long and pointed, the second large, the upper one small, margin above this tooth not crenulate. Hind femora with a few setigerous punctures, tibiæ fimbriate at apex, with rather large, unequal spinules, the transverse ridges practically obliterated, first joint of hind tarsi a trifle shorter than the next three. Length, 3 mm., 1/12 inch.

This insect belongs to that group of *Aphodius* in which the scutellum is short, and may be placed in Dr. Horn's group Ic, where it will follow *A. larreæ*, from which it differs in size, colour, the strong marginal line of the prothorax, and presumably in the secondary sexual characters which are well marked in *larreæ*, though my series of several *Kansanus* show no definable differences in those parts usually affected. The maculation of the elytra in *Kansanus* is of a simple type, consisting of an indefinite, broken arcuate band composed of several detached longitudinal brownish spots, reaching from humerus to humerus and crossing the suture in front of the middle; the suture and a small subapical spot also brownish.

For a good series of this interesting beetle, I am indebted to Mr. Warren Knaus, who took it in some numbers at Englewood in south-western Kansas.

ELAPHIDION, Serv.

E. Fuchsii, n. sp.—Rufo-castaneous, shining, clothed with rather long, whitish, recumbent pubescence that does not conceal the surface. Form moderately elongate. Head with rather deep, longitudinal frontal impression, front coarsely and moderately densely punctate, the punctures becoming closely cribrate in the occipital region which, with the vertex, is indistinctly carinate. Antennæ (male) scarcely attaining the tip of the elytra, pubescent and sparsely hairy, very feebly serrate, third joint with a short internal spine which is less than one fifth the length of the fourth joint, fourth and fifth joints still more feebly unispinose. The third and fifth joints are about equal in length and are a trifle longer than the fourth; the outer edges of the third and following are compressed and rather sharp, eleventh constricted and suddenly smaller near the tip. Prothorax ellipsoidal, convex both ways, sides regularly arcuate, base broader than the apex, hind angles distinct; disk coarsely and closely punctate, a poorly defined median line, best marked just behind the middle where it is smooth and elevated. On each side are two elevations which correspond to the callosities usually found in this genus, but they are not different in sculpture from the rest of the surface. Scutellum rounded, finely emarginate behind and clothed with fine, dense whitish pubescence. Elytra broadest across the humeri, humeral umbone limited internally by a distinct impression; sides slightly convergent towards the tip, no well-defined costæ, though faint traces may be seen. Punctuation deep, rather coarse, well-separated, much finer towards the tip; apices not quite regularly separately rounded, with a moderately long, sharp sutural spine, outside of which is a short tooth. Body beneath finely scabropunctate, punctuation closer than above. Legs paler, tibiæ carinate, thighs not toothed nor spined. Length, 21 mm., = .84 inch.

This is one of the forms connecting *Elaphidion* with *Aneflus*, and I quite agree with Major Casey that the latter genus is untenable under the present definition. The type is a male from Independence, California, where it was captured by myself, about the middle of July, by beating desert shrubs. The female is slightly larger, less slender, the antennæ only about two-thirds the length of the body and the apex of the elytra is scarcely spinose, the spines being much reduced.

The relationships of this species are sufficiently well indicated by the characters given in description. It is evidently very distinct from all of our other species in the combination of antennal and elytral characters.

ZONITIS, Fabr.

Z. zonitoides, Duges.—At Alpine, Texas, I took a few specimens of an insect which I refer to this species, "a widely distributed form in the highlands of Mexico and Guatemala" (Champion, Biologia Centrali-Americana). It resembles *Z. sparsa*, Lec., but is at once known by the black head, shorter maxillary processes and more densely punctured elytra. It belongs to the genus *Nemognatha* as defined by LeConte and Horn. Major Casey has suppressed *Nemognatha* (Illiger, 1807), I think properly since the discovery of new Mexican forms has shown the invalidity of the only character (the length of the maxillary processes) upon which it has hitherto been separable from *Zonitis*. That author has also united *Gnathium* with *Zonitis*, the slight thickening of the tips of the antennæ scarcely warranting the continuation of the former name as a generic term. The course outlined above will, however, necessitate some changes in specific nomenclature; thus *Z. immaculata*, Say, becomes preoccupied by *Z. immaculata*, Ill., and I propose to designate the former species by the name *Z. Sayi*, in memory of its pioneer describer.

Z. Californica, n. sp.—Elongate, convex, shining, with sparse, bristly pubescence. Brownish, head piceous, elytra obscure, brownish yellow. Head with coarse, deep punctures, covering the entire surface, except a small callus between the eyes, more crowded and confluent just above the antennal insertions, antennæ thickened externally, third joint not quite twice the length of the second, evidently longer than the fourth, maxillary processes about half as long as the body. Prothorax broader than long, wider in front of the middle, sides narrowing slightly to the base and more rapidly and arcuately to the apex, basal margin nearly straight, the bead high and well marked; disk uneven, with coarse, deep, scattered punctures, irregularly disposed. Elytra at base much wider than the prothorax, finely rugulose but shining, punctures of moderate size, confused at base, but sparser, and forming rather regular rows on the disk. Body beneath shining, legs punctured, spurs of the hind tibiæ unequal, tapering to tip, the inner one much more slender. Length, about 5 mm., .20 inch.

I collected this species in great numbers in the mountains near Tehachapi, California, several years ago, and have distributed it as new to many museums. It is not closely allied to any of our native species of *Gnathium* (to which division it belongs by the antennal structure), the coarsely and closely punctured head serving by itself as a good differential character.

IULUS IMPRESSUS (?) IN THE CORN-FIELD.

Iulidæ are not insects, and my only hope of getting this note on record is in that their work in the corn-fields of the Middle West may be easily confused with that of several very different species of insects.

In the autumn of 1882, when the larvæ of *Heliothis armiger* were very abundant in the corn-fields of Northern Illinois, I noticed that some ears, instead of having been attacked at the tip, had been entered from without indiscriminately along the length of the ear and directly through the husks. In such cases the depredator had penetrated the husks, leaving a neat circular hole about the size of a No. 4 shot. After reaching the ear it continued to work inward, penetrating a kernel, and on reaching the germ changed its course and tunnelled parallel with the cob, eating out the germs of kernel after kernel in the row, or sometimes changing over to an adjoining row of kernels. I soon found that depredations of this sort were not due to Heliothis, but to a Myriopod thought to belong to this species. Here, except to the most careful observer, was an injury caused by a single organism, whereas, in truth, there were two depredators, and but one of them an insect at all.

In early September, 1904, in a field of corn near Rochester, Minnesota, I was one morning astonished to find what seemed to be the same species of Iulus, infesting the ears of unripe corn in a different manner; in this case feeding on the green silk and leaving the ears with much the appearance of having been ravaged by beetles of the genus *Epicauta*, or *Diabrotica* perhaps, or even grasshoppers. There was hardly a hill of corn to be found that did not show evidences of having been ravaged, in many cases the ears being entirely denuded of silk. At this time, about 9 a.m., as many as four of the Iulus were to be found in the silk of belated ears, sometimes eating off the silk to the kernels, but in no case were they observed to attack the latter. From the fact that many of the creatures had seemingly finished their breakfast, and were to be found on the leaves or among the husks, and, later in the day, none were to be found feeding, it is possible that they depredate only in the cool of the day. Mr. Chas. N. Ainslie, of Rochester, who was with me at the time, made some later observations for me, and wrote me afterwards that they were even more plentiful than when I was there, he having found as many as ten individuals within a radius of fifteen inches about one hill of corn, their numbers being greatest near the margin of the field. In the case of Mr. Ainslie, the observations were made toward evening, thus indicating crepuscular habits.

It is quite possible this may prove to be some other species than *Iulus impressus*, but it is the very common species of the Middle West, and its work may be easily mistaken for that of insects.

F. M. Webster, Urbana, Ill.

PRELIMINARY LIST OF THE MACRO-LEPIDOPTERA OF ALBERTA, N.-W. T.

BY F. H. WOLLEY DOD, MILLARVILLE, ALTA., N.-W. T.

(Continued from page 156.)

309. *M. Dodii*, Smith.—(CAN. ENT., XXXVI., 152, June, 1904) Described from Calgary and from Bullion Park, Colo. The type is a Calgary specimen at Rutger's College, and I have two ♂ co-types. The description says: "Resembling *Tacoma* and *rugosa*..... *Rugosa* is a smaller, less irrorate, more sharply defined species, with ordinary spots of different form, s. t. line hardly indented, costal region gray, and colour of secondaries more decidedly yellow." A year's endeavour to procure *rugosa* for comparison has elicited a single ♂, in perfect condition, through the kindness of Dr. Fletcher. The specimen comes from Mr. C. H. Young, of Hurdman's Bridge, which I believe is within about 12 miles of Ottawa. It is hardly below the average size of *Dodii*, but almost entirely lacks the rusty red-brown suffusion so characteristic in that species. As it is reasonable to suspect similar variation in discoidal spots to *Dodii*, I will not compare them. There is practically no trace of the **W** in. s. t. line, rather prominent and constant in *Dodii*, and unlike that species, this line is preceded by black dentate points. The basal half of costal region is gray, which is never the case in *Dodii*, and there is a distinct black basal streak reaching to t. a. line, of which the new species never shows any trace whatever. The secondaries in *Dodii* vary much in shade, but most of them are quite as yellowish as in my *rugosa*. Presuming that this Ottawa specimen is not altogether off type, I feel pretty safe in saying what I have long suspected, viz.: that Dr. Holland's figure of *rugosa* is *Dodii*, which, on the whole, seems more likely to be confused with *Tacoma*. Fairly common at light and treacle. June and July.

310. *M. lilacina*, Herv.—Common. July to middle August. A widely variable species, which I have for years been trying to separate into two. My series at present consists of 72 specimens, about one-third ♀ ♀, and there seems after all to be every intergrade between the two extreme forms. One form is of a dirty, bluish-gray, with rusty shadings above the median vein. The maculation is very indistinct, and there are no contrasts, even fresh specimens often having a very sordid appearance. The other extreme form has marked contrasts between the light and dark shades. Such specimens sometimes have the orbicular and median and sub-median veins centrally, very conspicuously whitish, the

claviform thickly outlined with black, and hind margin and s. t. space rather contrastingly pale compared with the rest of the wing. Judging from a recent letter to me, Sir George Hampson seems to have confused some specimens of this form which I sent him with *Dodii*, which has something of the same range of variation, some specimens showing very much the same contrasts, but always much redder. I am not always sure of unset specimens, but no forms of *lilacina* and *Dodii* which I have seen are really alike. In fact, *lilacina*, in having less of the rusty-red, a more direct s. t. line, and an occasional tendency to develop a basal streak, is really a good deal more like *rugosa*. Prof. Smith has repeatedly seen both forms of my *lilacina*, and I have specimens of each bearing his own label. The specimen figured in Dr. Holland's book is about intermediate between the two extremes.

311. *M. acutermina*, Smith.—(Can. Ent., XXXVI., 153, June, 1904). Described from 5 ♂ ♂ and 2 ♀ ♀, partly Calgary material; the rest from Cartwright, Man.; B. C., and S. Dak. A ♂ co-type and five other specimens are in my collection. Very rare, and only taken during 1893 and 1899. End June to middle July. Its author states: "Related to *Goodellii* in general character; but is smaller, darker, the maculation barely traceable, and the apex of the primaries distinctly better marked." Until recently I had this species standing as *Goodellii*. The type is a Calgary specimen and is at Rutger's College.

312. *M. obscura*, Smith.—Sometimes very common at treacle in June. This species was formerly sent out by me in considerable numbers as *Hillia crasis*, under which name Prof. Smith had placed the form in his own collection. The species varies from a dark, reddish-brown to almost black, but always with a reddish tinge. The *vigilans* form of *crasis* is somewhat of the same colour, but though there is a similarity in general type of maculation between the two species, they are not really alike. I obtained ova of *obscura* in 1894. The larvæ hatched on June 30th, and fed on *Anemone patens*. They had all pupated but two on Sept. 3rd. I have no further notes.

313. *M. ectrapela*, Smith.—Described from a ♂ taken by Mr. T. E. Bean at Agnes Lake, near Laggan, Alta. (B. C. in error), 6,800 feet, on Aug. 21st, and from a ♀ taken at 6,000 feet in Garfield Co., Colorado, by Mr. Bruce. The description tells us: "The species has the wing form of *ectypa*, and the same general type of maculation, but is of a somewhat sordid dull brown." The type is at Washington.

314. *M. renigera*, Steph.—Common July to middle Aug.

315. *M. lucina*, Smith.—Fairly common. July and Aug. For discussions on the synonomy of the *olivacea* and *comis* group, vide Trans. Am. Ent. Soc., XXVII., 230, et seq., June, 1901; Journ. N. Y. Ent. Soc., XI., 1903, p. 14; and Proc. U. S. Nat. Mus., XXVII., p. 853, 1904, the latter being Dr. Dyar's "Kootenai list," previously referred to. I submitted a good series of Calgary specimens to Prof. Smith two or three years ago, and he referred them to *lucina*, remarking that they seemed "to emphasize the difference from *olivacea* and the close relationship to *altua* I think you prove fairly well that we have races only. But *altua* and *lucina*, though closer than I originally supposed, are not thereby brought nearer to *olivacea*." Unless he has changed his opinion, his listing them as all distinct is perhaps a trifle misleading. *Lucina* was described from Manitoba and Yellowstone Park, Wyo., and I have a ♂ co-type and two other ♂ ♂, much alike, from Winnipeg. *Altua* was described from Glenwood Spgs., Colo.; South Dakota; and Hot Springs, New Mexico (one ♀, elevation 7,000 feet). The latter specimen Prof. Smith has kindly sent me as a co-type, together with two Glenwood Spgs. ♀ ♀. I can match the *altua* ♀ ♀ much more nearly in my Calgary series than I can my Winnipeg *lucina* ♂ ♂. The latter to my eye have more of a tendency to an olivaceous shading than is visible anywhere in the local series. Beyond this I have had no opportunity for comparison with other material. Viewed by itself, my series varies from untinted shades of light and dark gray in the ♂ ♂, to dark ♀ ♀ without contrasts. The majority of the specimens are, however, tinted, especially in basal and s. t. spaces, the tints ranging from yellowish green, through sienna brown, to an almost rosy red. This often is faintly diffused throughout the specimen. As Dr. Dyar seems to have studied an enormous amount of material, a copy of his latest reference of the names as given in the Kootenai list may not be out of place.

OLIVACEA, Morr. Atlantic region.

obscurior, Smith.

race *lucina*, Smith. Western prairies.

race *altua*, Smith (= ? *vau-media*, Sm.). Rocky Mountains.

megarena, Smith.

race *petita*, Smith. Pacific coast and mountains.

Comis, Grote. Pacific coast and mountains adjoining.

obnigra, Smith.

rectilinea, Smith.

male *petita*, Smith.

davena, *Smith*.

316. *M. sutrina*, Grt.—Very rare. End May and June. One of my specimens has been compared with the types by Sir George Hampson. Prof. Smith says in his Catalogue: "It resembles *lustralis* more than it does *cuneata*, but the male antennæ are simple. In its position next to *cuneata*, its resemblance to *lustralis* will serve to distinguish it." Since that was written, a closer acquaintance with the species has caused him to change his opinion, for in his "Notes on Mamestra," in Journ. N. Y. Ent. Soc., XI., No. 1, p. 16 (March, 1903), he says: "*Sutrina*, which is so nearly like *cuneata* that it might be readily confused with it, has the male characters entirely different." I have only had opportunity of comparing it with one specimen of each; *lustralis* sent me named by Dr. Barnes, and *cuneata* from Victoria, B. C. I should certainly never have remarked upon any resemblance to *lustralis*, whilst its likeness to *cuneata* is very decided. That specimen differs from it, however, chiefly in having the s. t. line obsolete, the orbicular oblong, oblique, instead of rounded, and a small golden-yellow speck in s. t. space near anal angle. All my *sutrina*, too, have a gray patch in median area between claviform and reniform. My specimen of *cuneata* shows no trace of this whatever. A further note on *sutrina* and its genitalia will be found in Ent. News for December, 1898. It has also been taken in Yellowstone Park, Wyo. The type is from Colorado.

317. *M. lorea*, Grt.—Fairly common. End June and July.

318. *M. larissa*, Smith.—Described from here, and figured with the description. Not common. June and early July. Its author says: "The ♂ is a bright specimen and reminds me at first sight of *Litholomia napæa*. The species belongs in the series with *vicina*, but differs from all the forms of that species represented in my collection by the absence of a black basal streak." The suggestion of *napæa* at first sight is undeniable, though, when closely examined, the two are so unlike that comparison here would be odious. Most of my specimens have a fine, black basal streak. They differ from the species I hold as *vicina* amongst other respects in having the claviform ovate rather than sharply dentate. The name has been by some collectors looked upon as a synonym of *anguina*, Grote, but on

my referring the matter to Prof. Smith, he says: "I doubt their identity. I have been inclined to believe, as you suggest, that the two are identical, but have recently procured a couple of specimens of the Eastern form, which make me believe that *larissa* can be held as sufficiently distinct. The trouble is that *anguina* is so very rare in collections that I have not been able to get together a sufficient amount of material to give me its range of variation." I sent the species to Sir George Hampson, who reported: "=*anguina*, Grote; like type." *Anguina* is recorded from Colorado and Nebraska, as well as from some of the Eastern States. Dr. Holland's figure of it is not clear enough to enable me to judge from. The type of *larissa* is at Washington.

319. *M. pensilis*, Grt.—Not common. Middle June to middle July. I had the species standing as *Hadena characta* until quite recently, when Sir George Hampson corrected the error, pointing out the hairy eyes. He added: "They are not much like each other." In that case Dr. Holland's figure of *H. characta* is really *M. pensilis**, as it is exactly like the present species. If such is the case, it is probable that with this, as also with *Dodii*, I am partly responsible for the error myself, having supplied the specimens for many of Dr. Holland's figures under erroneous names, by which I then knew them. From Dr. Dyar's remarks under this species in his Kootenai list, there seems to be confusion of it with *vicina*. Taking Holland's *characta* ♂ as *pensilis* ♂, his figure of *vicina*, ♀, which is like the species I hold as such named by Dr. Fletcher, gives rather an exaggerated idea of the ordinary differences, the sexual dimorphism being at least as strong as the true specific differences. A pair sent me for naming by Mr. T. N. Willing, from Regina, seemed to me a dark, even-coloured variety of the Calgary species I have as *pensilis*, and I named it so with some doubt. Mr. Willing subsequently showed me a similar ♀ from the same locality named *vicina* by Dr. Fletcher, and after comparing Dr. Holland's figure, I let the name stand. I can match Mr. Willing's ♂ by one kindly lent me for comparison by Mr. Criddle, of Aweme, Man. My *pensilis* is clearer gray, the maculation plainer, and s. t. space slightly contrasting with central shade. In *vicina* this space is scarcely paler. Of the two it is what I refer to as *vicina* which most nearly resembles *larissa*.

320. *Neuronia Americana*, Smith.—Very rare, as a rule, but was rather common at light in 1894. I believe none of the genus are treacle-

*Dr. Dyar tells me that this is the case.

goers. Middle Aug. to middle Sept. A figure of the type is given with the description, and seems to indicate a much darker specimen than any I have seen. The figures in Ent. News for December, 1895, and in Dr. Holland's book are both good ones. The description was made from "male and female in the collection of Mr. A. Schoenborn at Washington, received from Mr. Titus Ulke." They were taken at Boulder, Mont. I cannot say where the specimens are now.

321. *Dargida procinctus*, Grt.—Apparently a migrant, and, as a rule, comparatively common. Have taken it at treacle from June to early October. Fresh specimens in Aug. and Sept.

322. *Scotogramma luteola*, Smith.—Described from Laggan (B. C. in error), 6,700 ft, July and Aug. (Bean.) I took it in fine condition on Slate Mt., Laggan, and Saddle Back, near Lake Louise, at and above the timber line (about 7,000 feet), and at about the same elevation on Sulphur Mt., Banff. It appeared to be common. It would sometimes take wing readily, and at others would sit exposed to the sun on stones, which it exactly assimilated in colour, and drop off, feigning death, when an attempt was made to pill-box it. This was on Aug. 8th to 10th, and many specimens were perfectly fresh. I have seen a specimen taken on Mt. Rundle, Banff, labelled June 27th. The maculation is not often as clear as indicated in the figure accompanying the description. The type is in the U. S. National collection. I took a few specimens, some of them a bit worn, near Agnes Lake, Laggan, on July 20th, 1904.

323. *S. uniformis*, Smith.—Described from a ♂ taken by Mr. Bean at Laggan, on July 31st, 1891, far above timber (7,000 ft.). Other specimens were taken. A figure accompanies the description. The type is in the National collection at Washington. I have specimens fitting the description in my series under *luteola*. I may be mixing the two, or *uniformis* may possibly be an extreme form of that species.

324. *S. phoca*, Mœschl?—Very rare. July. I took two specimens and saw several more flying in sunshine on Slate Mt., Laggan, at about 6,500 ft., on Aug. 8th, 1900. Three specimens in the foothills at Lineham's lower log camp on Sheep Creek, July 12th, 1896. A few have been taken here at head of Pine Creek, one of them at light, the rest at flowers at dusk. A single ♀ at Laggan, on flowers, near the station, July 16th, 1904. It is probably not uncommon in the foothills. Prof. Smith named it with a query.

325. *S. inconcinna*, Sm.—Three specimens in fine condition, from "Lineham's log camp" locality (vide supra), one at light, the other two

at flowers at dusk. Middle July. The species was described from Colorado. I took a specimen at Laggan, on flowers, in sunshine, near the station, on July 16th, 1904.

326. *Anarta cordigera*, Thunb.—I have seen a ♀ taken by Mr. N. B. Sanson on Mt. Rundle, Banff, on June 27th, 1900, which I believe to be this species.

327. *A. melanopa*, Thunb.—Three ♂ ♂, one in fine condition, the other two worn, on "Saddle Back," near Lake Louise, Laggan, at timber line (about 7,000 feet), Aug. 10th, 1900.

328. *A. quadrilunata*, Grt.?—One ♂, Slate Mt., Laggan, above timber, between 7,000 and 7,800 feet, Aug. 8th, 1900. Prof. Smith says he has a ♀ from the same locality, and adds: "They differ from Colorado examples in larger size and obsolete maculation of primaries. A different species is not excluded."

329. *A. lapponica*, Thunb.?—A single ♀, taken by Mrs. Nicholl near the summit of Mt. St. Piran, Laggan, at about 8,500 feet, on July 20th, 1904, is in my collection, and has been referred doubtfully to this species by Prof. Smith.

330. *A.* sp.?—A few years ago Prof. Smith referred this species doubtfully as a var. of *Zetterstedtii*, Staud., from which it differs, he said, in having a white disk on secondaries. Recently he advised me to leave it unnamed until I could discover Sir George Hampson's opinion about this and other species in the genus. It is a common species at and above timber line (about 7,000 feet) at Laggan. End of July and early August.

331. *Nephelodes pectinatus*, Smith?—Not rare at light some seasons, entirely absent in others. End of August. I have only six specimens, all ♂ ♂, which show a considerable range of variation, from a very pale yellowish luteous to a handsome dark olive brown, or rosaceous mixed with olive. A specimen of the last mentioned form was named *pectinatus* by Prof. Smith a few years ago. Quite recently I sent him one of the olive-brown forms, together with a specimen from Victoria, B. C. He commented: "*Pectinatus* I believe, but very unlike the only example in my collection, which comes from Oregon. In your specimens the bristle is distinctly more obvious than in mine, where it is scarcely to be dignified by that name in proportion to the long point. On the other hand, in my local specimens the bristle is as long as the branch. There may be more variation in the antennæ than I have supposed, and this may be to some extent geographical." The species was described from two ♂ ♂ from

Corfield, Vancouver Island, and vaguely "British Columbia." It is said to resemble *minians*, but has a difference in the male antennæ. "In *minians* the pectinations are rather short, and lengthened by a curved bristle at the tip. In *pectinatus* this bristle is absent, but the branches themselves are longer, and a little enlarged towards the tip. The differences are thus obvious, and emphasize the rather scant superficial character. The specimen from B. C. has a peculiar greenish tinge to the ground colour which I have not seen in the eastern species." I rather suspect that this is the form I have above referred to as olive brown. The antennal differences are not obvious to the naked eye. A figure of the species accompanies the description. I have compared my Calgary series with specimens from Aweme, Man.; Regina, Assa.; Victoria, B. C.; and with *minians* from New Brighton, Pa., and from Chicago. Some of the specimens from the last locality were sent me as var. *violans*, and differ from what seem to be typical *minians* in being paler and having less of the bronze, olive or violaceous tints. All the western specimens differ from the eastern in the form of ♂ antennæ above referred to, except that in none of my specimens is the bristle entirely lacking. Otherwise the differences appear to be merely of colour and shade, and are not easy to define. Some of the eastern specimens are very large, but they show a considerable variation in size, and the smallest are smaller than the average of the western series. As a whole *minians* is more richly coloured and possesses more lustre, though occasional specimens are scarcely separable except by the ♂ antennæ. The series of nine specimens from Calgary, Regina and Aweme, are obviously all one species, those from the latter place coming nearest to *minians* in colour of primaries. The secondaries of these nine are, however, very much paler than in the majority of my *minians*. The Victoria specimens, on the other hand, have much more even, duller smoky secondaries than *minians*, and are throughout rather more sordid in appearance than anything that I have from east of the Rockies. From the locality, I presume them to be typical, so that the prairie form is probably at least a fairly well marked local race. The type of *pectinatus* is at Washington.

Incidentally, Prof. Smith has very kindly spared me one of his Winnipeg specimens of *tertialis* ♂. This he described from that place in Journ. N. Y. Ent. Soc., XI., p. 19 (March, 1903), and says: "The species resembles the eastern form in general appearance and type of maculation, but is decidedly smaller throughout. The fringes are more even, with hardly a trace of scalloping, and there is no obvious median shade on the

primaries. Add to this a distinct difference in the genitalia of the male, and the specific separation proves inevitable." If the specimen was placed with the Chicago and east coast series, and all labels removed, I defy any man to pick it out, without recourse to the genitalia, by any one of the characters mentioned. The type of *tertialis* is in Prof. Smith's collection at Rutger's College.

332. *Leucania unipuncta*, Haw.—Rare on the whole. Apparently a migrant. Worn specimens end of June and July, fresh specimens in October. Treacle.

333. *L. minorata*, Smith.—Not rare. July to middle Aug. The name is the one given me to the species by Prof. Smith. The species was described from three ♂ ♂ from California and Oregon, which were said to resemble *oxygale*, Grt. "But are smaller throughout, the ground colour reddish, the secondaries darker." The only locality given for *oxygale* in either Dr. Dyar's List or Prof. Smith's Catalogue is Colorado, so I presume it was described from there. In the Revision of the genus, however (Proc. U. S. Nat. Mus., Vol. XXV., pages 159–209, 1902), both in the table on page 164 and under the descriptions, Prof. Smith distinctly treats of *oxygale* as having the darker secondaries of the two. He there describes *luteopallens* from Canada and the eastern States as distinct from both in being paler throughout, and claims that all three are separable from European *pallens*, citing *minorata* as its American representative. Dr. Dyar in his Kootenai List records *oxygale* as common at Kaslo, and refers all four names to one species, treating *oxygale* and *luteopallens* as geographical races of *pallens*, and *minorata* as a varietal and not racial form of *oxygale*. I have a good series of *luteopallens* from several places in the east, and specimens exactly like the Calgary form from Victoria, B. C., and Manitoba, and a Kaslo series from Dr. Dyar also inseparable from it. As a whole my eastern specimens are certainly paler and less streaky throughout, and have less black on secondaries than the western specimens, but the extremes overlap. The type of *minorata* is at Washington, and is figured with the description.

334. *L. albilinea*, Hubn.—Four ♂ ♂ only, June 30th to July 21st, in three different years. They have the secondaries dark smoky throughout, scarcely or not at all paler at the base. At light.

335. *L. diffusa*, Walk.—Very rare. I have seven ♂ ♂ only, May 20th to July 22nd. Light. The primaries are paler in colour than the preceding, and secondaries smoky in outer half only. I had the two mixed until about a year ago, but a close examination brought me to

believe I had two species, and a specimen of each has now been named as above by Prof. Smith. I have examined over seventy specimens from eastern Canada and the States, and find the majority of them like my Calgary *diffusa* series. I have so far only seen one ♂ (from Sherborn, Mass.), with secondaries practically as dark as my palest Calgary *albilinea*, but this, in common with the majority of them, has slightly paler primaries. It is from Sherborn, Mass., that I have received the darkest eastern ♂ ♂. But two or three ♀ ♀ from New Brighton, Pa., and one from Ottawa, are exact mates for the four Calgary *albilinea*. The range of variation in the eastern specimens is considerable, but I have entirely failed in all attempts to separate them into two species, as they seem to grade right through. The smallest specimens seem as a rule to be the palest, but in the "Revision" *diffusa* is stated to be larger as well as paler than *albilinea*. Were it not that my two short Calgary series are so sharply contrasting, I should not try to keep the names separate. What Dr. Holland figures as *albilinea* is exactly like what I hold as Calgary *diffusa*.

336. *L. heterodoxa*, Smith. — Described partly from Laggan material (B. C. in error), 5,000 feet, July 2nd, T. E. Bean. The type is from California, and is at Washington.

336a. *L. megadia*, Smith.—Described partly from Calgary material. The type is a Calgary specimen, and is at Rutger's College.

The above two forms, which I agree with Dr. Dyar in treating as one species, are generally common at Calgary. *Megadia* has a black basal streak which is lacking in *heterodoxa*. True *heterodoxa* is by far the least common form, but every intergrade can be found. This appears to be the western representative of *insueta*, from which it differs mainly in lacking a reddish tinge, though Prof. Smith in his "Revision" mentions a specimen as red as any *insueta* he ever saw. None of my specimens have any reddish tinge, but Mr. F. A. Merrick has kindly lent me a Chicago specimen of *insueta* which lacks it, and in which the basal streak is hardly traceable. *Insueta* seems to have somewhat paler secondaries. The figure of *heterodoxa* given with the description shows the basal streak, and is therefore really a better representative of *megadia*. I sent two of my ♂ ♂ to Sir George Hampson, who says they agree with the type of *dia*, Grote. *Dia* was described from California. So also was *heterodoxa*, in part, and *megadia* is stated to occur there.

337. *L. multilinea*, Walk.?—Not rare. End July and early Aug. Though I query the name, I feel fairly confident that it will ultimately

prove to be the western form of that species, from which it differs in being a little larger and having the secondaries not quite so clearly white, and generally slightly smoky outwardly. I have compared over a dozen specimens from the eastern States, which, from the description given in the "Revision," and from Dr. Holland's figure, I believed to be true *multilinea*, and an eastern specimen so named for me by Prof. Smith has confirmed my belief. I received it from nearly every one of my correspondents, who sent me *phragmitidicola* mixed with that species, but had no difficulty in picking it out, and from the very first associated it with the Calgary form. My local series runs extremely near some dark streaky forms of *anteroclara*, and though I have for years kept the two in different series, it is only during the last few months that I have at last succeeded in drawing a line between them. I have a pair of specimens marked "*anteroclara*, co-type," by Prof. Smith. The ♀ is the ordinary form of that series, and I am at present assuming that it is of the same species as the actual types. The ♂ is my No. 337, but rather a rubbed specimen. Prof. Smith still confuses the two, but that is probably only because I have not yet sent him a good series of this, which is far less common than *anteroclara*. Reference to Dr. Holland's figure of *multilinea* will show, apart from the pale veins, three contrastingly pale streaks on the primaries. The first runs from the base, below the subcostal vein, through the cell, and thence obliquely to the apex. The second runs also from the base to hind margin between median and submedian veins; and the third borders the inner margin, but does not run quite from the base. These pale shades are a conspicuous feature in all my eastern *multilinea* and my No. 337. *Anteroclara* as a rule is very much more unicolorous, but in the most streaky specimens, though the dark intervening shades are occasionally almost as conspicuous, the pale shades do not seem to contrast in the same way. All my *multilinea* have a marginal row of minute black specks on secondaries, usually most conspicuous beneath. These are occasionally noticeable in *anteroclara*, but are not nearly so constant. Another characteristic of *multilinea* is the greater amount of smoky shadings on primaries beneath. Comparing the two Calgary series alone, besides the above-mentioned differences, *anteroclara* has rather darker secondaries, but altogether the variation is such that single specimens sometimes require very careful comparison to determine. Whilst the sexes in my eastern *multilinea* and Calgary *anteroclara* are about

equally divided, I am not aware that I have yet seen a Calgary ♀ of *multilinea.* But I have compared a ♀ from Cartwright, Man., kindly loaned me by Mr. F. A. Merrick, of New Brighton, Pa., who also sent me a ♂ from the same locality. The two specimens are practically alike, and resemble the Calgary form in every detail.

338. *L. commoides*, Gr.—Common. July and early Aug. Easily separable from any of its allies known to me by the uniformly dark smoky secondaries in both sexes. The darkest shadings on the primaries are black, instead of brown as in *multilinea*, but some specimens are very like the Calgary forms of that species and of *anteroclara* when the wings are closed. A distinctive feature not mentioned in the "Revision," but well shown in Dr. Holland's figure, is the narrow dark shading, sometimes faint, but more usually rather prominent on upper margin of median vein. Eastern specimens do not seem to differ.

339. *L. anteroclara*, Smith.—Described partly from Calgary material. The types are from Calgary. The ♂ is at Washington, and the ♀ at Rutger's College. A pair marked "Co-type" are in my own collection, but the ♂ I have above referred to *multilinea.* Always common, sometimes very abundant. End June to Aug. On one or two mornings during 1902 I saw moths emptied out of the Calgary arc light globes literally in pints. Quite ninety per cent. of them were this species. It seems to be a close ally of *phragmitidicola*, Guen. Under the description Prof. Smith says: "Comparing two series, their distinctness is obvious; comparing selected individuals of each, the sexual characters might have to be resorted to. It is suggestive of a local form that I have no *phragmitidicola* from the range given for this species, nor any example of this species within the range given for *phragmitidicola.*" Elsewhere he states: "*Anteroclara* as a whole is a little larger, a little broader winged, with somewhat less pointed primaries. It is more yellow in colour, less streaky in appearance, the black dot at the end of the median vein often wanting, never prominent, transverse posterior line reduced to two small interspaceal dots, and the upper margin of the pale median line not in any way relieved. The secondaries, especially in the ♀, have a smoky appearance, and altogether this seems a duller, more even species than its ally." To the above I would add that the t. p. line is sometimes entirely wanting.

(To be continued.)

DESCRIPTION OF THE LARVA OF *DELPHASTUS PUSILLUS*, LEC., WITH NOTES ON THE HABITS OF THE SPECIES.

BY W. E. BRITTON, NEW HAVEN, CONN.

In collecting insects at Poquonock, Conn., July 18, 1904, my assistant, Mr. B. H. Walden, found coccinellid larvæ feeding upon a species of *Aleyrodes* which is probably undescribed, and fairly common there upon the leaves of hazel, *Corylus Americanus*. These larvæ were brought to the laboratory, and were fed upon *Aleyrodes vaporariorum*, Westw., which they ate greedily. On July 23rd two had moulted; on the 28th, these had changed to pupæ, and the third larva had begun to devour one of the papæ—his aleyrodid food supply having become exhausted.

From the uninjured pupa an adult emerged August 2nd, and the remaining larva pupated August 1st, the adult emerging August 8th. The adult is a small black beetle, about 1.5 mm. in length. Specimens sent to Washington were determined by Mr. E. A. Schwarz as *Delphastus pusillus*, Lec. This species has been placed in the genera *Œneis* by LeConte, and *Cryptognatha*, by Crotch and Horn, but Casey has erected the genus *Delphastus** on account of the difference in structure. *Delphastus* now includes four American species.

In searching the more accessible literature of American entomology, I fail to find any description of *Delphastus pusillus*, or any reference to the feeding habits of the species, though the habits of most coccinellid larvæ are known. I therefore give the following description and notes as an addition to the knowledge of this species, though it is possible that a description of this larva has been published, and that I have overlooked it.

When first taken, this larva was uniformly light gray or dirty white in colour, with dark spots on the dorsum of the first thoracic segment. After moulting, the general colour was much darker, and the following description applies to the final stage of the larva before it changed to a pupa.

Larva: Length, about 4 mm.; greatest width, about 2 mm. Ground colour gray or dirty white, with a white median line extending the entire length of thorax and abdomen. There are two pear-shaped black spots on the front of the dorsum of the first thoracic segment, one on each side of the median line. Just back of these spots are a pair of larger dark gray or lead-coloured spots, one on each side of and close to the median line. A lead-coloured area appears on the lateral margins of the segment.

*T. L. Casey, Journal New York Entomological Society, Vol. VII., p. 111.

The second and third thoracic segments are similarly marked, but the spots are more elongated transversely, and all are gray or lead-coloured. The abdominal segments have one transverse spot or band each side of the median line instead of two as on the thorax. These spots and the marginal markings are of the same colour as those on the second and third thoracic segments. The markings are such as to give the appearance of a narrow median white line, with slightly broader, submarginal whitish lines, with margins and cross-bands of gray or lead-colour. Each segment of the body bears a number of short hairs. The legs are gray, tipped with white.

The head is gray and narrow, and can scarcely be seen from above when the larva is feeding. It attacks an aleyrodid, eating a circular hole in the dorsum usually of the thoracic region, and devours the inner portion, leaving the shell or skin. Many punctured empty skins were found on the leaves. The accompanying illustration is from a camera lucida sketch, and shows the appearance of the larva while feeding upon a specimen of *Aleyrodes*. (Fig. 12).

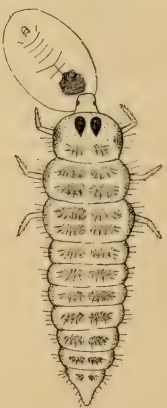


Fig. 12.

Pupa: Length, 2.5 mm., including the cast skin; width, 1.5 mm. Colour creamy white, cast skin gray, and covering about one-third of the caudal extremity. The pupa is fastened to the leaf after the manner of the *Coccinellidæ*.

The writer visited Poquonock September 12th, and tried to find more of these larvæ, but they had all transformed. A number of small black beetles were found on the hazel leaves, and, as was expected, proved to be specifically identical with the reared specimens. These were not seen feeding upon the *Aleyrodes*, which were very abundant at this time on the leaves; but the beetles were hurrying about over the leaves, as if hunting for something, perhaps food, possibly a place to oviposit, but more likely a sheltered place in which to pass the winter. These brief notes give no idea of the number of broods of *Delphastus*, but possibly the coming season may present an opportunity to continue the observations. From our knowledge of other *Coccinellidæ*, it may be assumed that there are at least two broods each season.

THE THREE RANATRAS OF THE NORTH-EASTERN UNITED STATES.

BY J. R. DE LA TORRE BUENO, NEW YORK.

Several entomologists have discussed with me the question of the distinguishing characters of *Ranatra quadridentata*, Stal, and *Ranatra fusca*, Pal. Beauv., and in consequence I venture to set forth here briefly and plainly the differences between these two and *Ranatra Kirkaldyi*, n. sp , which I took for the first time in New York State.

A few preliminary remarks on this genus may perhaps be found interesting. The genus *Ranatra* was established in 1790 (sec. Kirkaldy) by Fabricius without a type being fixed, and under it he described *R. filiformis* and *R. elongata*, both from Tranquebar. In it naturally fell Linné's *Nepa linearis*, which Latreille in 1802 made the type of the genus. The described American species, exclusive of synonyms, are the following :

Ranatra Fabricii, Guérin, from Cuba.
Ranatra rabida, F. B. White, from Brazil.
Ranatra unidentata, Stal, from Rio Janeiro.
Ranatra quadridentata Stal, from Mexico.
Ranatra fusca, Pal. Beauv., from the United States.
Ranatra annulipes, Stal, from Brazil.

To these six it is my privilege to add a seventh:

Ranatra Kirkaldyi, n. sp., from the type localities, Putnam Co., N. Y., and Chicago, Ills.

Ranatra fusca, Pal. Beauv., and *R. quadridentata*, Stal, appear to have been much confused with each other, due to the very brief description of the former given by its author, and perhaps also to the fact that small specimens of the latter are hardly distinguishable from the former on a superficial examination. Palisot de Beauvois, after his extremely brief Latin description, makes a comparison between *R. fusca* and the European *R. linearis*, and, of course, in the absence of the latter for comparison, it is hardly possible to fix on the former with any degree of certainty. His description simply reads : "Greenish-fuscous, setæ shorter than the body, wings reddish-fuscous." The last is quite a noticeable character of the insect. There are to be found more than a few *R. quadridentata* in which the air-tubes are noticeably shorter than the body, but the wings in this species are hyaline, "very slightly infuscated," as

Stal puts it. On superficial characters for easy identification, they may be separated as follows :

With broad anterior femora.

With a blunt tooth near the tibial joint.....*R. quadridentata*, Stal.

Without a blunt tooth near the tibial joint.....*R. Kirkaldyi*, n. sp.

With narrow anterior femora, smooth, save for the middle tooth.....*R. fusca*, Pal. Beauv.

R. Kirkaldyi can at once be distinguished from both *fusca* and *quadridentata* by its smaller size, being little over two-thirds the length of either of them; short and much constricted prothorax, and very short air-tubes. *R. fusca* can be further differentiated from *quadridentata* by the much longer legs, the tarsal claws reaching nearly to the extremity of the air-tube, and the extremities of the femora of the third pair of legs attaining to the end of the penultimate abdominal segment; by the prominent eyes; and by the prothorax being slimmer and longer and unisulcate beneath; while in *R. quadridentata* the legs are not unduly long, the tarsal claws of the third pair barely going beyond the middle of the air-tube, and the extremity of the femora going but little beyond the anterior margin of the penultimate abdominal segment; the eyes moderately large; and the prothorax more stoutly built and bisulcate beneath.

As *R. Kirkaldyi* is still undescribed, I briefly give its salient characters, prior to a full description to be published later.

Ranatra Kirkaldyi, n. sp.—Abdominis dorsum orange brown; eyes small, not very prominent; prothorax much constricted at the middle, bisulcate beneath; wings smoky; anterior femora broad, with a prominent tooth near the middle, otherwise smooth; posterior tarsi extending beyond the middle of the air-tube; air-tube shorter than the length of the abdomen; legs banded.

Length from end of abdomen to tip of rostrum: Males 23 mm. to 26.4 mm., females 27 to 31 mm.

HEMEROPHILA KINCAIDIELLA, Busck.—A Correction.—This species, described by Mr. A. Busck, in the Proceedings of the United States National Museum, XXVII., p. 746, 1904, paper No. 1375, is *Sciaphila trigonana*, Walsingham. [Lepidoptera-Heterocera British Museum, Part IV., p. 22, 1879; Dyar's Catalogue, No. 5413; Smith's List, 1903, 5831.] The species is well figured by Walsingham, Plate LXV., fig. 7.—W. D. Kearfott, Montclair, N. J.

SOME BEES OF THE GENUS NOMADA FROM WISCONSIN.

BY T. D. A. COCKERELL, BOULDER, COLO.

Nomada Graenicheri, n. sp.— ♀. Length, about 10½ mm.; black, with bright lemon-yellow markings, the only red is on base of antennæ, legs, and a little on mandibles; mandibles simple; anterior coxæ without spines; basal nervure meeting transverso-medial; third antennal joint slightly longer than fourth. This is a *Xanthidium* with the face black in the middle and with yellow lateral marks, like the European *N. succincta*. It has the strongest possible superficial resemblance to *N. modesta*, but in addition to the absence of spines on the coxæ, it differs thus: labrum dark, with a transverse yellow spot anteriorly; clypeus with a yellow mark on each side, pointed mesad; supraclypeal area with two minute yellow spots; lateral face-marks extending nearly to summits of eyes, obliquely truncate at end, and concave opposite the antennæ; mesothorax dull, coarsely but extremely closely punctured; metathorax wholly black; legs with a good deal of yellew, anterior and hind coxæ marked with yellow, the later copiously; all the femora behind, and the anterior and hind tibiæ behind, strongly blackened; all the tibiæ with yellow, the hind ones largely yellow, in front with a black spot, shading above into a rufous cloud, on the apical half; basal joint of hind tarsi dark, practically black on outer side, with a short yellow stripe posteriorly; abdomen narrower, and not so shiny; venter with broad yellow bands on the second and third segments, and a good deal of yellow on the third. The first three joints of the antennæ are mainly red, the rest black; posterior orbits with a narrow yellow stripe; upper border of prothorax, tubercles, transverse mark on pleura, two large spots on scutellum, and a stripe on post-scutellum, as well as five continuous bands on abdomen, all yellow. Tegulæ largely yellow; wings dusky, stigma dark ferruginous, nervures fuscous.

Milwaukee, Wisconsin, Aug. 16, 1903. (Dr. S. Graenicher.)*

Nomada (Xanthidium) pseudops, n. sp.— ♀. Length, about 9 mm.; red, with black and yellow markings; basal nervure meeting transverso-medial on the basal side; third antennal joint conspicuously shorter than fourth. Head broad, facial quadrangle about square, somewhat broadened above; labrum and under side of head with rather abundant white hair, face with less; cheeks with the anterior half red and the posterior

*Dr. Graenicher writes that *N. Graenicheri* is probably parasitic on one of the late summer species of *Andrena*, as it occurs with them on *Helianthus* spp.

half black, but no yellow; interocellar region, and about base of antennæ, blackened; labrum and lower corners of face yellow, the yellow extending as a suffusion, with no defined margin, across the clypeus and half-way up the sides of the face; antennæ entirely bright ferruginous, the flagellum stout; mesothorax coarsely roughened, red, with a median black stripe, but no yellow; prothorax black or almost, with its upper border and the tubercles yellow; pleura red, with a large triangular yellow patch in front; area between the wings and the hind legs black; metathorax red, with four yellow spots, the lower ones large, the upper round and placed on the sides of the enclosure, looking like eyes, the whole combination resembling a picture of a skull somewhat; tegulæ red, shining but punctured; wings moderately dusky, the tips darker, stigma bright ferruginous, nervures fuscous; legs red, hind femora blackened behind, anterior and middle femora with black behind at base; abdomen minutely roughened, rather shiny, red with broad yellow bands on segments 2 to 5, that on 5 interrupted laterally; first segment black basally, and with an obscure yellow band, the middle third of which is wanting; fifth segment fringed with silver-white hair; pygidial plate broad shovel-shaped; venter red, with a large transverse pyriform yellow mark on each side of segments 2 and 3, and two crescent-shaped yellow marks on 5.

Milwaukee, Wisconsin, June 8, 1903. (Dr. S. Graenicher.) Looks much like *N. Coloradensis*, Ckll., but smaller, and differing in many details.

Nomada sphaerogaster, Ckll., var. ♂.—♀. Length, about 8 mm.; black, with lemon-yellow markings, and some red, but none on thorax; mandibles and anterior coxæ simple; basal nervure passing a short distance basad of transverso-medial; third antennal joint a little shorter than fourth. Head and thorax coarsely roughened, and quite hairy, the dorsal hair tinged with fuscous; head broad, facial quadrangle much broader than long; no yellow about head, cheeks entirely black; labrum, mandibles, malar region, broad anterior margin of clypeus, and a minute inconspicuous stripe on each side of face adjacent to eye and small spot at summit of eye, all ferruginous; antennæ entirely ferruginous, suffused with blackish above, except the third joint; upper border of prothorax, most of tubercles, and two large confluent spots on scutellum, yellow; the rest of the thorax is black; sides of metathoracic area with conspicuous grooves; legs black to about the middle of the femora (more behind), and beyond that red, the middle and hind tibiæ with a blackish streak behind, the knees inclined to be yellowish, the hind tibiæ with a yellow stripe on

outer edge, and the middle tibiæ with faint indications of an apical yellow spot; abdomen very broad, black with yellow bands, that on first segment broadly interrupted, on second to fourth broad at sides, and narrowed or slightly interrupted in the middle, on fourth notched behind laterally; fifth segment yellow, with the base, and a round spot on each side, black; venter dark reddish, irregularly banded with lighter, and with a little yellow.

Milwaukee, Wisconsin, April 21, 1903. (Dr. S. Graenicher.) By the posterior notching of the fourth abdominal band, it resembles *N. vicina*, which is otherwise different. It differs from typical *N. sphaerogaster* (Proc. Phila. Acad., 1903, p. 611) by its ferruginous tegulæ, and some slight details of the markings, but I feel assured that it is conspecific. If the difference should prove constant in a long series, it ought to have a distinct name.

NOTES ON THE LEPIDOPTERA OF THE YEAR 1904.

BY E. FIRMSTONE HEATH, CARTWRIGHT, MANITOBA.

The spring here was an unusually cold and late one, and it was not until April 17th that I saw a moth of any description, and that "first swallow" was only a *Depressaria Canadensis*, Busck. I did not see a single specimen of *Leucobrephos Middendorfi*, Men., though an April seldom goes by without my doing so, and generally at some awkward moment when no net is handy. Year before last I was repotting some plants on the sunny side of my house, when a *Leucobrephos* flew against me, dropped at my feet, and was off again before I could pot it.

It was not until April 28th that I noticed any Noctuids flying at sunset, and that night, and during two or three subsequent ones, I took a nice series of Tæniocampas at my sugared trees, chiefly *T. alia*, Guen., with a few *subterminate*, Smith, and one or two *pacifica*, Harv. There was also the usual sprinkling of hibernating species, among which the most notable capture was a *Scopelosoma devia*, Grote.

The weather then became cold again, and it was not till quite the end of May that moths were once more in evidence. Currant bloom—the wild black and the garden varieties—usually very productive, this year proved a blank. Throughout the summer all butterflies and moths were far less numerous than usual, and yet I made a few notable captures of species which I had not previously taken, or which are always rare. As their names will appear in Dr. Fletcher's "Record," I need not repeat them here.

There was hardly one evening on which light proved attractive, consequently I took very few Sphingidæ ; even *Smerinthus geminatus*, which is often a perfect nuisance from its numbers, hardly appeared. Yet, if one may judge from the number of *Ampelophaga chærilus*, Cram., that visited my sugared trees, the other species occurring here should have been on the wing in their usual numbers.

Later on, in June, the genus *Acronycta* came out rather strongly, and gave me a few nice things. The most abundant species of the year at sugar was *Noctua inopinatus*, Smith, and with them were a few rather larger and redder moths, which I conclude were *Noctua haruspica*, Grote. The two moths are so similar that it is very difficult to separate any number under their respective names. *N. inopinatus* replaced *Hadena devastatrix*, which, strange to say, was decidedly scarce.

I particularly noticed the absence of the genera *Leucania* and *Plusia* —by the latter name I mean the genus as it formerly stood, before it was split up into sundry subgenera. Even *Leucania unipuncta*, Haw., was a rarity. All Arctians were also scarce. *Cosmia paleacea*, Esper., and *punctirena*, Smith, came to sugar rather freely, and so did *Xanthia flavago*, Fabr., much more so than in any previous year.

The autumnal genera Catocala, Xylina, etc., were not nearly so abundantly represented as in the average of seasons, with the exception of *C. briseis*, Edw., of which I took a long series showing considerable variation, one or two having large white blotches on the primaries, which I believe is very unusual.

Those species of Xylina which were most abundant during the previous year were but poorly represented. I think on the whole that *X. tepida*, Grote, was the most plentiful.

The larva of *Sthenopis argenteo-maculatus*, Harris, seems to be a very general root-feeder. I have several times ploughed it out of the roots of scrub willows on the prairie, and during the second week of May I was having some black cherry and hazel scrub dug up, to enlarge my garden, when a full-fed larva was disturbed. I put it into a box, and it produced a moth, a female, during the second week of July. This species was also scarce; I only saw one other on the wing instead of the usual dozen or so.

As to Geometers, except for two or three species that come to sugar like Noctuids, I hardly saw any—they were not to be taken, though I particularly wanted several species. However, when I get all the names that are wanting in my collection, which I hope soon to do with the kind

aid of Rev. G. W. Taylor, of Vancouver Island, I shall have a small addition to make to the Manitoban list published by Mr. Hanham. All larvæ were scarce, even "cutworms" did little or no damage, and though I wanted to rear some *Malacosoma fragilis*, Stretch., I did not come across any of their "tents."

NEW SPECIES OF NORTH AMERICAN LEPIDOPTERA.

BY WILLIAM BARNES, S. B., M. D., DECATUR, ILL.

Cerathosia idella, n. sp.—Expanse, 25 mm.

Fore wings white, with small orange patch at apex, marked with black dots and bars as follows: Six spots on costa, about equidistant, the basal one slightly removed from costa and the second smaller than the others, a round spot in cell, followed by four short parallel transverse bars beyond it, lying close together, the third one joining spot on costa. A short longitudinal dash on inner margin at base, followed by five transverse bars from median vein to inner margin, the first, however, not quite reaching it. Of these the third and fifth are narrower than the others and in the male especially tend to become broken, probably in some specimens they would be almost or quite wanting. In the ♀ there is a sub-terminal row of spots, irregular in shape and size. In the ♂ these are reduced to three or four. On the outer margin there are some rather heavy black blotches. In the ♂ these show as quite well defined quadrate patches at inner angle, opposite cell and at apex. The fringe is black opposite these spots and between the lower two, but white between the apical and median ones. Hind wings orange, slightly darker outwardly. Head, collar and thorax white, with black spots on shoulders, centre of patagia and top of thorax. The thorax has, in addition, a posterior band. These markings show an admixture of metallic-blue scales under lens. Abdomen orange above, white beneath. Both wings orange beneath, with the black markings of upper surface more or less in evidence on fore wings. There is a short black bar from costa, at outer fourth, outwardly oblique, and the black markings of fringe are as on upper surface. Palpi black above and at tip, white beneath. Antennæ blackish. Tibiæ of fore legs black above. All tarsi checkered black and white as well as tibiæ of posterior and middle pairs.

Types ♂ and ♀. Pima Co., Arizona. July 20th.

Catabena begallo, n. sp.—♂. Expanse, 24 mm.

Dark blackish gray, with a slight reddish tinge, of about the same shade as *Egestis*. The ground colour is of the red shade, but in fresh

specimens it is mostly concealed by a thick sprinkling of blackish scales. In worn specimens, much more of the ground colour is in evidence and there is a well-marked strigate appearance, especially outwardly. The orbicular is present as a minute, inconspicuous dot, with black centre. The reniform is to the naked eye the only contrasting feature in the maculation, and even it is not very prominent. It is of the ground colour with some white scales mixed, especially at lower end, and has a few black scales around it, but the margin is not at all well defined. With the lens a very faint dentate t. p. line can be made out. There is a faint interrupted black line at base of fringes, which are slightly checkered. The interruptions in the terminal line are due to faint whitish points.

Hind wings white, very slightly dusky outwardly and with fuscous line at base of fringe, which is white. In the female, while the fore wings are as in the ♂, the hind wings are more fuscous outwardly and there can be made out a very faint trace of mesial line. Head and thorax concolorous with fore wings, abdomen whitish in male, somewhat darker in ♀.

Fore wings beneath fuscous, lighter along inner margin. Hind wings with some fuscous scales along costa, faint discal dot. In the female the shades are somewhat darker.

Types, Southern Arizona, Pima Co.—This species can be readily distinguished by the pale contrasting reniform.

Platysenta temecula, n. s.— ♂. Expanse, 26 mm.

Dark reddish-brown, with darker shades, veins darkened. A central shade extends from base along median nerve to or beyond end of cell. This is continued to margin, above inner angle, as a rather broad, though not strongly-contrasting, band. There is also a narrower shade running from end of cell to apex; the wing being a very little paler above and below it. There are two well-marked black intravenular dashes beyond cell. At end of cell is a short transverse white bar, preceded and followed by minute yellow points. The mark, while distinct, is small, and the detail only to be made out with lens. There is a row of black terminal lunules and the fringe is checkered, though not strongly so. Inconspicuous pale points on costa mark inception of the transverse lines, which are else barely to be made out, though indications of the t. p. can be faintly traced under the lens by pale points.

Hind wings fuscous, darker outwardly. Fringe paler, with dark line at base. Head and thorax concolorous with fore, abdomen with hind wings. Collar obscurely transversely banded.

Beneath fore wing fuscous, with slight reddish tinge; a distinct, though not prominent, mesial band not reaching inner margin; discal dot present. Hind wings whitish outwardly, reddish-fuscous along costa and outwardly, discal dot and mesial band as on fore wing.

Type, 1 ♂. Huachuca Mts., Arizona.

Tricholita baranca, n. sp.—♂. Expanse, 28 mm.

General colour seal-brown, with a slight reddish tinge, more or less frosted with pale scales. Head and thorax somewhat paler, showing less of the reddish tint, owing to a greater admixture of the pale hairs. Ordinary lines all tracable in perfect specimens, though not at all prominent. Under the lens the veins seem to be somewhat darkened and very sparsely coated with pale scales. Basal half-line evident, more noticeable from the pale filling than from the only very slightly darker limiting lines. T. a. almost transverse, irregularly dentate, slightly darker than ground colour, accompanied by slightly paler inner shade. Median shade rather more prominent than the other lines, outwardly oblique to lower end of reniform, thence inwardly oblique to middle of inner margin. T. p. scalloped, only slightly exserted, beyond cell, thence quite direct to inner margin. S. t. wavy, irregular, somewhat darker than ground colour. Median and terminal spaces slightly darker than remainder of wing. Costal and basal areas somewhat more frosted than remainder of wing. The inception of the transverse lines on costa are somewhat darkened, the pale filling showing as light dots. Towards apex there are three or four more pale bands, none of which, however, are strongly pronounced, but plainly visible under the lens. Fringe concolorous with terminal space, with faint darker basal line and pale dots at end of veins. Claviform obsolete and orbicular usually so, though in one specimen a faint minute brownish ring can be made out under the lens. Reniform margined by white points, usually four in the outer row and two or three in the inner, the outer row is much better developed and the second from the costa is evidently composed of the fusion of two others, as it is about twice as large and is in some specimens partly divided. Between the two rows of pale dots the spot is filled with reddish scales. The lower point of the inner row is the largest in all the specimens before me, those lying above it showing more or less of a tendency to become obsolete. Hind wings fuscous with more or less of a reddish mixture. Very faint traces of discal dot and mesial band, scarcely discernible except in certain lights. Fringe fuscous at base, whitish externally. Beneath fore wings paler than above, darkened centrally, paler along costa and inner margin. Traces of dark extra

mesial band and pale discal dot. Hind wings with distinct dark discal dot and mesial band. Thorax, legs and abdomen concolorous with wing.

Types ♂ and ♀. Kerrville, Texas. Received from Mr. Lacey.

Ipimorpha Nanaimo, n. sp.—Expanse, 33 mm.

Considerably paler than *pleonectusa*, with more of a yellowish tinge. The ordinary markings showing dark against the pale ground, while in the old species the reverse is the case. The t. a. line presents more of an inward and the t. p. line more of an outward curve, and the ordinary spots are much less clearly defined. The basal half-line not in evidence, while the s. t. is only marked by the contrast between the slightly darker subterminal space with the lighter terminal. The terminal space is somewhat shaded with black scales outwardly, while the fringe and the costa for a short distance from apex has a quite pronounced reddish tint. The orbicular has a slight pointed projection outward, corresponding to a similar inward projection of the reniform. The mesial band of hind is dark and followed by a slightly darker shade than the ground colour. Beneath there is a well-marked common mesial band. There is, however, no trace of the ordinary spots as in *pleonectusa*.

Type, 1 ♂. Victoria, B. C., from Mr. Hanham.

(To be continued.)

OBITUARY.

Tertia Silvia Cruickshank, wife of Charles Stevenson, Secretary-Treasurer of the Mount Royal Entomological Club, Montreal, died on the 8th April, after a few days' illness. She was born in Scotland on the 26th December, 1866, and came to Canada in 1892, and was married on the day of her arrival, 31st May.

She was an enthusiastic naturalist from her childhood, and made pets of all kinds of animals. Soon after her marriage, her husband took up his school-boy hobby of collecting insects, in which she joined him. In the summer months she spent what time she could spare from her domestic duties in entomological work and was a very successful collector.

She has left two children, Kenneth Ruttan, aged 11, and Ivy Silvia, aged 8, both of whom show promise of becoming entomologists.

The Montreal Branch of the Entomological Society of Ontario and the Mount Royal Entomological Club were well represented at her funeral. The former showed their sympathy by a wreath and the latter by a floral anchor. All the members of the Society unite in very deep sympathy with Mr. Stevenson and his children in their sad bereavement.

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PRACTICAL AND POPULAR ENTOMOLOGY.—No. 6.

The Struggle with the Codling Moth.

BY WM. LOCHHEAD, ONTARIO AGRICULTURAL COLLEGE, GUELPH.

Everyone recognizes the destructive work of the Codling Moth, but everyone does not know how to fight it. Much has been written about it, for the great loss occasioned by this one insect has compelled not only fruit-growers but also governments to investigate its habits and to determine practicable methods for its control. As a result of the labours of many scientific observers, its life-history is now fairly well known, and its control is now no longer a matter of mere chance. The recent work of Slingerland and Simpson in particular has cleared up many doubtful points in its life-history, so that the careful, intelligent fruit-grower can now rely upon remedies which are practically effective.

Although the "worm" or larva is well known on account of its abundance, the other stages of the Codling Moth are still unfamiliar to most fruit-growers. This is not to be wondered at, for the moth is quite small, and is a very shy creature. Other small moths are frequently mistaken for it, and this probably explains why a few years ago trap-lanterns were thought by some credulous people to be effective agents in their control. As a matter of fact, Codling Moths do not appear to be attracted by lights, and there are but few instances on record where they have been captured by such means.

It is not many years since the eggs of the Codling Moth were first observed and noted. They are very small, and most careful observations are required to detect them. With the first brood they are found most frequently on the leaves, sometimes on the young fruit, but usually on the fruit in the case of the second brood. About ten or eleven days elapse before the young larvæ emerge. Naturally, the majority of the newly-hatched larvæ of the first brood feed on leaf-tissue. Soon, however, they find the fruit, and enter it, usually at the calyx end. The tunnel to the core, the cavity at the core, and the exit tunnel and its plug are too well known to require description. The larva lives within the apple about

twenty days before it emerges to spin its cocoon under some rude protective covering, such as rough bark, cracks, bands, etc. Six days later the larva within the cocoon transforms to a pupa, and two weeks after it has entered the pupal state the moth appears. The average duration of the first generation is about fifty days. In districts where there is but one generation in a year, the larval stage is lengthened to nearly ten months, for the winter is passed as a larva within a cocoon. Where there are two generations the moths emerge in August to deposit eggs on the apple for the second brood of larvæ, which work throughout August and September in the developed fruit. This second brood of "worms" is more destructive than the first, as their ravages are committed on the later and more valuable fruit, often after it has been picked and stored.

From the standpoint of the control of the Codling Moth it is important to know definitely when the moths deposit their eggs, and when these eggs hatch. The observations of many competent entomologists indicate that the egg-laying period may extend over several weeks with both generations of moths.

When we consider the problem of the control of the Codling Moth we must emphasize the importance of these lengthened egg-laying periods, more especially when we bear in mind the habits of the larvæ. It is clear from what has been stated, that the early larvæ may be killed by poisoning the leaves, and by placing poison in the calyx end of the apple; and the second brood may be killed by the spraying of the fruit, for the eggs of this brood are, as a rule, deposited on the fruit.

Experiments carried out both in the East and the West show that a very large percentage of worm-free apples is obtained when two sprayings are made for the first brood of larvæ, and one for the second brood when it is present: the first spraying a few days after the petals fall; the second two or three weeks later; and the third about the middle of August in ordinary seasons. Slingerland lays great emphasis on the first spraying for Eastern conditions, while Simpson is of the opinion that the second spraying is most effective for Western conditions.

A very important factor in successful spraying is the arsenical mixture used. Paris Green has for many years been used successfully by careful sprayers, but with very indifferent results by careless sprayers. If not carefully mixed and agitated Paris Green settles rapidly to the bottom, and much of it will remain at the bottom of the spray barrel when the solution is all sprayed out.

Arsenite of lime, arsenite of soda, and arsenate of lead are now recommended in preference to Paris Green. They are much cheaper and more effective, since they mix readily in water or Bordeaux Mixture.

In the matter of orchard practice the Arsenic Compounds should always be used along with Bordeaux Mixture, to form a combined fungicide and insecticide against both the Apple Scab and the Codling worm. In small orchards a good hand-power spray-pump is all that is needed to apply the solutions, but in large orchards "power-sprayers" are strongly recommended. The high pressure which is developed allows the use of two lines of hose operating 8 to 12 nozzles. With such an outfit the time required to spray even a very large orchard is reduced to a minimum. Besides, the fineness of the spray leads to more effective work.

The presence of the San Jose Scale, the Grape Rots, the Apple Scab and the Plum Rot in the fruit-regions of Ontario has compelled our fruit-growers to spray. As business men they have been forced into the use of power-sprayers, and this year has witnessed the introduction of the power-sprayer, with the abandonment of the hand-power outfit as a "back number."

As an aid to spraying for the control of the Codling Moth, banding of trees is still practised in many sections. Although this method is quite effective when it is properly looked after, it is worse than useless—it is actually harmful—when the bands are not examined regularly every ten days through June and July for cocoons. Moreover, banding is an expensive treatment when the time required for the fixing of the bands in place, and their examination every ten days, is taken into consideration. It might be preferable to give an additional spraying instead.

There are some remedies which are of little or no value. Simpson places the following remedies in this class: Moth balls hung up in trees; smudging with ill-smelling compounds; plugging the trees with sulphur; plugging the roots with calomel; trap-lanterns; and baiting the moths with vinegar and molasses.

The fruit-grower is aided greatly in his struggle with the Codling Moth by several friends. Our birds especially are great helpers. The Chickadee, the Downy Woodpecker, Nuthatch, Bluebird, Swallows, Sparrows, and Wren, are all valuable, and their presence in the orchard is very desirable.

There are also several minute insects which prey upon the Codling Moth.

Finally, besides all this, the fruit-grower can do much to lessen his losses by what is known as clean farming. This is shown in the appearance of his orchard, as a result of pruning, removal of rubbish, careful cultivation, and manuring. By such means he may increase the productiveness by securing better fruit, free from scab and worm-hole.

A NEW CECIDOMYIID ON COTTON.

BY D. W. COQUILLETT, WASHINGTON, D. C.

During the past winter Dr. L. O. Howard received specimens of a Cecidomyiid from Sir Daniel Morris, Director of the Imperial Department of Agriculture for the West Indies, with the statement that the larvæ live in the cambium layer of cotton plants. Up to the present time no representative of this family has been recorded as depredating upon cotton so far as I am aware, and at the request of Sir D. Morris the species is duly characterized herewith :

Porricondyla (Epidosis) gossypii, new species.

Antennæ of male longer than the head and body together, composed of about twenty-one joints, of which the first two are sessile and scarcely longer than wide, the remaining joints, except the last one, with a bulbous basal portion bearing a whorl of bristly hairs and a narrow apical part, the latter being slightly shorter than the thickened part of each joint. Antennæ of female about two-thirds as long as the head and body combined, composed of twenty-six nearly sessile joints, the first two joints somewhat conical, the others constricted in the middle, the third joint the most strongly so, each succeeding joint less constricted. Wings hyaline, third vein (the apparent second vein) strongly curved and ending below the extreme tip of the wing, small crossvein very oblique and weakly sigmoid. Colours yellow, the sternum and greater part of mesonotum brown, head blackish, antennæ of female and the enlarged portions of those of the male brown, the constricted portions of the male antennæ white, legs dusky-whitish. Length, 1.5 mm.

Described from several dry and shriveled specimens of both sexes. Type No. 8399, U. S. National Museum. From Barbados, West Indies.

The full-grown larvæ are yellowish-white, the median portion chiefly orange-red; the skin is smooth except on the under side, where there are many minute tubercles arranged in about six irregular transverse rows on the median portion of each segment. The breast-bone is yellow, cylindrical, and with a small knob at the anterior end. The larvæ live beneath the bark of cotton plants, without forming galls.

NEW SPECIES OF NOCTUIDÆ FOR 1905.—No. 2.

BY JOHN B. SMITH, SC. D., NEW BRUNSWICK, N. J.

Euxoa vestitura, n. sp.—Ground colour dull smoky-brown, varying a little to reddish-brown in one direction and luteous in another. Head and thorax concolorous. Vestiture hairy rather than scaly, neither the collar nor the patagia well defined. Primaries with the usual maculation at least traceable and often distinct, never contrasting, the lines ranging from smoky to black. Basal line geminate, always marked on costa and often complete. T. p. line geminate, the inner portion less defined, more even and sometimes obscure: included space broad, concolorous or a little paler than ground: outer part of line usually distinct, often broken on the veins, more or less out-curved in the interspaces, as a whole the line nearly upright. T. p. line geminate, the inner portion crenulate, outer narrow, even and sometimes wanting. As a whole the line makes a very even curve over the cell and is then parallel with the outer margin. S. t. line marked by a slightly darker preceding shade in the s. t. space, by a vague difference in shade between s. t. and terminal space, or altogether wanting. There may be a series of terminal lunules, a narrow terminal line or no marking at all. Fringes concolorous. There is usually a rather well marked median shade, somewhat diffuse, outwardly bent from the middle of costa to the end of the median vein, then parallel with the t. p. line to the inner margin. Claviform wanting. Orbicular wanting altogether, in most specimens, indicated in others by a few blackish scales. Reniform obscure, marked by two diffuse smoky blotches, indicating the lateral margins, and of these the inner may be absorbed in the median shade. Secondaries dull, smoky, outwardly darker, somewhat yellowish and lighter at base; fringes paler.

Expands.—1.26–1.46 inches = 31–36 mm. *Habitat.*—St. John, New Brunswick, August 9–19.

Eleven males and two females, most of them in at least fair condition. These specimens were taken in 1899 or 1900 and have been in my collection for years, somewhat doubtfully associated with *brunneigera*, of which I have never had good material from the type locality. Renewed study of such material as I have and of Hampson's description from the type has convinced me that I have a good species with characters as above stated. The range of variation is from a type in which all the markings are distinct to a form in which they are barely traceable and in part altogether obliterated. My series covers all intermediate forms. I regret that the labels do not have the name of the collector to whose liberality I owe the specimens.

June, 1905.

Euxoa floramina, n. sp.—Head, thorax and primaries powdery ashen-gray over a luteous ground. Head with two transverse frontal lines. Collar with two blackish lines, one just above the middle distinct, the other just below the tip, obscure and sometimes wanting. Thorax confusedly powdered with whitish scales, which tend to form paler edgings to the patagia. Primaries confusedly marked, with all the transverse maculation obsolete, yet hardly strigate. In the best marked examples the veins are powdered with whitish, there is a diffuse basal blackish streak, to which there may or may not be joined a small, loop-like claviform; there is an ill-defined triangular sub-apical cloud and there is a dusky shading in the median cell. The ordinary spots are narrowly pale ringed, concolorous, not readily made out. The orbicular is narrow, more or less elongate, oblique, irregular and rarely extends to or fuses with the reniform. The reniform is moderate in size or small and of the normal kidney shape. The small loop-like claviform is traceable in about half the specimens, and when it is best marked a narrow blackish line extends from its tip to the outer margin. There is a distinct pale terminal line preceded by black lunules. Secondaries in the male snowy white, immaculate; in the female evenly smoky. Beneath, whitish powdery; primaries more so than the secondaries; all wings with a more or less obvious discal spot, that of the secondaries tending to become lost; female darker than the male, throughout.

Expands.—1.15–1.35 inches = 29–34 mm. *Habitat.*—Stockton, Utah, Sept. 14–24; Mr. T. Spalding.

Twelve ♂ and five ♀, most of them in at least fair condition. All of these were, as I understand it, taken on flowers, in company with *Hollemanni* and *Nevada*, to which this species is allied. It most nearly resembles *Nevada* in appearance, but is smaller, much grayer, more confusedly marked, the ordinary spots are rarely fused and the secondaries in the female are evenly smoky instead of having a dusky outer border and smoky veins. With a series of each at hand the differences are even more striking than the description indicates.

Euxoa taura, n. sp.—Head, thorax and primaries dull, smoky, gray-brown; the first and second without defined markings, the primaries with all the lines well defined, but without contrasting ornamentation. The secondaries are dull pale yellowish to a well-defined extra median line, beyond which the wings are blackish, forming a broad dusky border. The abdomen is only a little paler than the thorax and the incisures are narrowly

blackish. On the primaries the basal line is geminate, black, broken. T. a. line geminate, black, the inner portion narrower and less marked, somewhat irregular, as a whole a little oblique outwardly. T. p. line geminate on the costa and on the outcurve; beyond that the outer line is lost and the inner is well defined and sharply crenulate, as a whole only a little outcurved over the cell, and very evenly oblique below it. S. t. line of the ground colour, a little irregular, marked by a series of triangular blackish spots, and the terminal space, which is darker except at apex. There is a series of distinct terminal lunules, beyond which there is a yellow line at the base of the fringes. An indefined dusky median shade crosses between the ordinary spots and darkens the cell at that point. The claviform is concolorous, loop-like, incompletely outlined by black scales. Orbicular concolorous, outlined by a narrow black ring. Reniform moderate in size, kidney-shaped, a little paler than the ground, with a smoky central line or shade, incompletely outlined by black scales. Beneath, primaries dull smoky-yellowish with a blackish extra median diffuse transverse shading; secondaries as above, but more diffusely marked and paler.

Expands.—1.45 inches = 36 mm. *Habitat.*—Regina, Assiniboia, August 5; T. N. Willing.

One male in fine condition received from Mr. F. H. Wolley Dod, (No. 11). This is a most remarkable species for the genus and was taken for an *Oncocnemis* at first sight; but the generic characters are unmistakable. The body is robust, the thoracic vestiture dense, consisting of flattened hair, collar and patagia well defined.

Euxoa ura, n. sp.—Head, thorax and primaries creamy-gray with a reddish tinge; the first two immaculate. Primaries with all the markings well defined, smoky, not contrasting, surface powdery. Basal line geminate, well marked as a rule, rarely obscure or even wanting. T. a. line geminate, broad, powdery, the inner portion more even, more slender and less marked; the outer forming obvious though not wide outcurves in the interspaces, as a whole a little outwardly oblique. T. p. line geminate, the outer portion even, narrow, tending to obsolescence, the inner lunulate or even crenulate, the teeth often extending to the outer portion; as a whole only a little outcurved from costa over cell and then nearly parallel with outer margin. A more or less obvious, diffuse shade crosses the median space between the ordinary spots, darkening the cell and then runs close to the t. p. line, tending to reach it in some examples. S. t.

line of the ground colour, only a little irregular, variably marked by a dusky preceding shade or a darker terminal space; rarely by both. There is no dark terminal line and in only a few cases are there small dusky lunules before the paler line at the base of the fringes. No trace of a claviform in any specimen. Orbicular of moderate size, or large, round or nearly so, concolorous or slightly paler, sometimes defined by a slightly darker border, sometimes by a pale annulus and sometimes scarcely outlined at all. Reniform large, broad, upright, scarcely kidney-shaped, never completely and sometimes not at all outlined; usually concolorous, occasionally a little paler in the middle and rarely a little darkened inferiorly. Secondaries white in both sexes, in the female tending to a dusky outer border; but that is never strongly marked and often absent. Beneath, primaries silky-whitish with a reddish or creamy tinge, with a discal cloud extending partially across the wing beyond the middle; secondaries immaculate or with a smoky outer band and discal lunule.

Expands.—1.00–1.40 inches = 25–35 mm. *Habitat.*—Stockton, Utah, September 18 to October 4; Mr. Thomas Spalding.

Eighteen males and ten females, most of them in good condition and showing so great a range of variation that I am by no means certain that only one species is involved. Of one form I have 8 ♂ and 3 ♀, and in all these a distinct reddish tinge is obvious. The size ranges from 1.27 to 1.40 inches, most specimens reaching and few exceeding 1.35 inches. The surface is obviously powdery, but all the markings are easily made out. Of a second form I have 6 ♂ and 5 ♀, and all of these are creamy-gray, with hardly a trace of red. This ranges in size from 1.23 to 1.35 inches, but most of the specimens are about 1.30 inches in expanse. The surface is distinctly less powdery and the tendency is to an obsolescence of the maculation. Of the third form I have 4 ♂ and 2 ♀, ranging in size from 1.00 to 1.20 inches, none of the males exceeding 1.10, while the two females are nearly of a size. This has a little reddish in its general appearance, but the maculation is greatly obscured throughout. This form is the more likely to prove distinct, and I propose the term *uramina* for it to call attention to its existence.

The body is robust, the thoracic vestiture somewhat loose, composed of long, flattened hair, with a finer woolly admixture, collar and patagia not well marked. The antennæ are long, in the male distinctly pectinated, but the teeth are not long and are furnished with terminal as well as lateral bristles. In a general way the species is allied to *edictalis*.

(To be continued.)

MANITOBA MICRO-LEPIDOPTERA.

BY W. D. KEARFOTT, MONTCLAIR, N. J.

The following list of Micro-Lepidoptera taken in the Province of Manitoba, is published for the purpose of recording the distribution of species, as well as an incentive to the collectors of the locality to make more than ordinary efforts to add to the number. The work that has already been done is most gratifying, and compares very favourably with local lists of many of the States, from which a great deal more would have been expected. For instance, the number of Tortricids alone exceeds the number credited to the State of New Jersey, in Prof. John B. Smith's list of 1899. But even in this family I have twenty-five or more additional species which appear to be new, but that are not described at the present time owing to the fact that most of them occur as only one or two specimens of a kind, and oftentimes more or less rubbed. I am quite sure that the work of another year or two will enable us to establish a list of Tortricids from this one province alone of not less than two hundred and fifty species. The same proportions will probably follow in the other families embraced under this general head. Collectors must not forget that each different manner of collecting produces results not found in any other way. Daylight with net, sugaring and light at night, and most valuable, breeding from the larvæ, also different hours of the day must be worked. Some species fly only very early in the morning, others only at twilight; likewise different localities, such as the prairies, along streams, in thickets and underbrush, and in the woods or forest, each will contribute some species not found elsewhere. The proof of these remarks will be found in the localities given in the lists below, regardless of how small the numbers were. Each collector has secured species not found by some or any of the others, showing the result of work along individual lines in favourite spots or methods.

I take pleasure in acknowledging my indebtedness to the following gentlemen for the privilege of studying and making record of their captures, as well as for the many specimens they have generously permitted me to retain:

Mr. E. Firmstone Heath has for several years sent me his captures, all of which are recorded under the name *Cartwright*.

Mr. Norman Criddle has sent me a very large number of most interesting species, all of them most beautifully and carefully expanded His captures are recorded as *Aweme*.

From Mr. A. T. Dennis, of *Beulah*, a small but interesting lot.

Through your—I must say *our*—well-beloved Dominion Entomologist-in-Chief, Dr. Jas. Fletcher, a very carefully prepared lot of specimens from Mr. L. E. Marmont, recorded as from *Rounthwaite*.

Through the courtesy of Dr. H. G. Dyar, a small lot of unidentified material from the National Museum, collected by Mr. A. W. Hanham, under the localities *Winnipeg* and *West Manitoba*. Also a few indifferent specimens collected by a couple of small boys at *Wattsview* and *Souris*.

In regard to the identifications, I would say: In the Tortricids I am entirely responsible for the names. The Pyralids have in a few cases been directly identified by Prof. Fernald, the balance named from my own collection, which, however, was also largely named by him. This also applies to the Crambids. The Phycits have been largely determined by Dr. Dyar. The Pterophorids I have worked out entirely by the synoptic tables in Fernald's Monograph of this group, comparing where possible with figures in Walsingham's "Ptero. of Cal. and Ore." Some of these names may have to be corrected, as synoptic tables at their best are very far from perfect. In the Tineid families, those that have been named have been identified by comparison with typical examples in my own and the National Museum collection. Many species, however, yet remain to be identified, and I purpose entering seriously into this work as soon as I have got the Tortricids in fairly good order.

In brackets, after many of the species, I have added the localities hitherto recorded, so far as I know them. A particularly noteworthy fact of this list is, that the Manitoba fauna seems to embrace species from both the coast and foothill districts of the Pacific Slope, from Texas and from the Eastern States, as well as a number of the European species that are accredited to North America.

The descriptions of the new species of Tortricids will follow the general list, with the hope that within the additional time permitted, more specimens of some of them will have been received.

Exartema olivaceanum, Fern.—Rounthwaite, July; Aweme, VII, 23 to 27. Recorded from Eastern States.

Exartema atrodentanum, Fern.—Aweme, VII, 23; Winnipeg. (Ohio to Texas.)

Exartema inornatanum, Clem.—Rounthwaite, July; Cartwright; Aweme, VII, 23. (Atlantic States.)

Olethreutes nimbatana, Clem.—Cartwright, VII, 10. This species is scarcely separable from *O. consanguinana*, Wlsm. The latter has a more or less obsolete paler fascia through the middle of the dark basal area, and is a little larger in size. (No. Atl. States.)

Olethreutes capreana, Hbn.—Aweme, VII, 12 to 20; Cartwright; Rounthwaite, July.

Olethreutes dimidiana, Lodsf.—Cartwright, one specimen, no date. Agrees with all other American specimens in my collection from the Atlantic States and as far west as Arkansas, but none of them agree with European examples. Further study may warrant separation.

Olethreutes deceptana, Kearf.—Aweme, VII, 24, to VIII, 8; Winnipeg.

Olethreutes hebesana, Walk.—Aweme, VI, 2. (Northern U. S.)

Olethreutes cyanana, Murtf. — Rounthwaite, June. (Penna. to Kansas.)

Olethreutes hemidesma, Zell.—Rounthwaite, June. I have bred this species from larvæ found in the beautiful pink flower heads of *Spiræa tormentosa*, during early July in New Jersey. (Maine to California.)

Olethreutes duplex, Wlsm.—Aweme, VII, 12; Cartwright; Winnipeg. (Colorado.)

Olethreutes nubilana, Clem.—Rounthwaite, July; Cartwright; Winnipeg. This is the species that I incorrectly identified as *O. vetulana*, Wlsm., *ante*, p. 43. The two species seem very much alike. I now have a very long series of Eastern and Canadian specimens, all of which agree with Clemens's type and description. I have only two rather badly rubbed California specimens, and await perfect material from this latter locality before deciding whether both species are good, or that *vetulana* is a synonym. (Penna. to Wis.)

Olethreutes coruscana, Clem. — Rounthwaite, July; Winnipeg; Aweme, VIII, 9 and 15. This identification is subject to correction. The Aweme specimens have white hind wings, reticulated with fuscous around the edges, while the Rounthwaite specimen is darker than any Eastern specimens I have. There seems to be a tendency for all four of these allied species, *chalybeana*, Wlsm, *coruscana*, Clem., *constellatana*, Zell., and *major*, Wlsm., to intergrade. (No. Atlantic States.)

Olethreutes instrutana, Clem.—Aweme, VII, 15 to 31; Beulah, VII, 15; Cartwright. (No. Atlantic States.)

Olethreutes campestrana, Zell.—Rounthwaite, July; Beulah, VIII. 15; Cartwright; Aweme, VI, 27, to VII, 9. (No. Atl. States.)

Olethreutes fuscalbana, Zell.—Aweme, VI, 13, to VII, 22. (Maine to Ohio.)

Olethreutes glaciana, Mschl.—Cartwright, VII, 1. (Ontario and Labrador.)

Olethreutes dilutifuscana, Wlsm.—Cartwright. (Oregon.)

Eucosma Morrisoni, Wlsm.—Rounthwaite, July; Aweme, VI, 25 to 29; Beulah.

Eucosma Ridingsana, Rob.—Rounthwaite, July; Beulah, VIII, 1. (Texas to Canada.)

Eucosma circulana, Hbn.—Rounthwaite, July; Cartwright; Souris.

Eucosma occipitana, Zell.—Beulah, VII, 15; Cartwright; Rounthwaite, July. Type from Texas, not since recorded.

Eucosma culminana, Wlsm.—Rounthwaite, July; Beulah, VIII, 15; Winnipeg. Most Eastern record.

Eucosma passerana, Wlsm.—Aweme, VI, 27. Type from California, not since recorded.

Eucosma vertumnana, Zell.—Rounthwaite, June; Aweme, VIII, 8. (New York and Texas.)

Eucosma nisella, Clerck.—Rounthwaite, August. I retain this name for the present, but am not convinced that the European and American species are the same.

Eucosma abbreviatana, Wlsm.—Aweme, V, 21, to VI, 6. (Mass. to D. C.)

Eucosma solicitana, Walk.—Aweme, VI, 16. (No. Atl. States.)

Eucosma illotana, Wlsm.—Aweme, VI, 15 to 25; Cartwright. (Oregon.)

Eucosma Scudderiana, Clem.—Aweme, VI, 18. (No. Atl. States.)

Eucosma dorsisignatana, Clem.—Aweme, VIII, 15 to 22; Cartwright. (Eastern States.)

Eucosma confluana, Kearf.—Aweme, VIII, 12.

Eucosma graduatana, Wlsm.—Aweme, V, 31. In Dyar's Catalogue, as well as in Fernald's Catalogue*, *graduatana* is made a synonym of *dorsisignatana*. The Aweme specimen is very close to Walsingham's figure and description, the hind wings are rust-red, the shape and size of spots on fore wing are similar, the specimen is little more than half the size of the latter, and it occurs in May, while *dorsisignatana* is a late summer or fall species. If Walsingham's figure is a fair representation of

*Trans. Am. Ent. Soc., X., p. 42, 1882.

his type, I have no doubt that this Aweme specimen is his species, and also that it is most decidedly distinct from *dorsisignatana*. Type from Texas.

Eucosma glomerana, Wlsm.—Aweme, July. Type from Texas, not since recorded.

Eucosma corosana, Wlsm.—Rounthwaite, July; Beulah, VII, 15. Type from Montana, and not since recorded.

Eucosma juncticiliana, Wlsm.—Aweme, VII, 26, to VIII, 15. (Northern U. S.)

Eucosma argentialbana, Wlsm.—Beulah, VII, 15; Aweme, VI, 6, to VI., 29; Rounthwaite, July. (Texas.)

Pseudogalleria inimicella, Zell.—Aweme, VI, 16; Beulah. New Western and Northern record for this species.

Thiodia striatana, Clem.—Rounthwaite, June. (Atlantic States.)

Thiodia dorsiatomana, Kearf.—West Manitoba.

Thiodia pallidicostana, Wlsm.—Aweme, VI, 16, to VII, 27; Beulah. VII, 15; Winnipeg; Cartwright.

Thiodia tenuiana, Wlsm.—Aweme, VI, 16. Rounthwaite, June.

Thiodia triangulana, Kearf.—Rounthwaite, July; Aweme, VI, 29.

Thiodia infimbriana, Dyar.—Aweme, VIII, 13; Cartwright; Rounthwaite, July; Winnipeg.

Thiodia refusana, Walk.—Rounthwaite, May; Aweme, V, 20 to 27.

(To be continued.)

NEW SPECIES OF PHLEPSIUS AND RELATED GENERA (HOMOPTERA).

BY E. D. BALL, UTAH AG. COLL., LOGAN.

Phlepsius Slossoni, n. sp.—Form and general appearance of *lippulus* nearly, slightly larger and darker, with a much longer, flatter vertex. Length, 6 mm.; width, 2 mm.

Vertex slightly acutely angled, the apex truncate, nearly twice longer on middle than against eyes, the disc concave, anterior margin sharp and broadly foliaceous, the line between this foliaceous margin and the front proper being sharply marked. Front slightly convex, evenly narrowing to the apically expanded clypeus. Elytra moderately long, appressed behind the middle, the apices slightly flaring. Venation obscure.

Colour: vertex pale fulvous and brown, a narrow median line to just before the middle forks at right angles, and finally slightly reflexed, black, a wedge-shaped mark from the apex back to this fork, the lateral margins and basal angles ivory white. The apical wedge is black-margined, and the lateral margins have a few slender wavy lines of black extending into

them. Pronotum cinereous or brownish, sprinkled with light dots, and crossed by three transverse light bands, the anterior one broad and equidistant from the median one and margin, the posterior one marginal. Scutellum with the anterior half cinereous brownish, and the posterior half lighter. Elytra ivory white, closely dotted with brownish fuscous, omitting three irregular bands of light, the anterior one broad and marked with a few reticulated lines, the other two narrower and more irregular. A black dot at the apex of each claval and apical nervure. Face finely dotted with brownish fuscous, an ivory mark above.

Genitalia : female segment short, very slightly produced with a faint median notch.

Described from a single female from Biscayne Bay, Fla. Received from Mrs. Annie T. Slosson, in whose honour it is named. This and the following species belong in a group with *lippulus* in colour marking, but are quite distinct structurally.

Phlepsius fastuosus, n. sp.—Form and general appearance of *Slossoni* nearly, but much stouter, and with a shorter, broader vertex. Length, 7.5 mm.; width, 2.75 mm.

Vertex distinctly obtusely angular, the apex blunt and rounding, nearly twice longer on middle than against eye, where it is very narrow, disc flat, anterior margin thin, very slightly foliaceous, especially at apex. Front broad, slightly convex, lateral margin rounding to clypeus.

Colour : vertex brownish cinereous, a cross on the apex; the lateral margins and a few dots on the disc ivory white. Face irregularly dotted with brownish cinereous, omitting a light spot above. Pronotum brownish cinereous, dotted and irregularly irrorate with ivory white. Elytra milky white, irregularly marked with fine reticulations and small dots of brownish fuscous. The dots are mostly arranged in two bands, one rather narrow and definite across the posterior third of the clavus, and the other broader and less distinct, occupying the whole apex behind the clavus, the anterior band becoming black along the suture, and fading out before reaching the costa.

Genitalia : female segment rather long, posterior margin truncate, the median two-thirds angularly produced, elevated and slightly notched at the apex. A pair of black spots outside the apical lobes.

Described from a single female from U. S. Nat. Museum. Collection taken at Las Vegas, N. Mex., June 8th, by Barber and Schwarz.

Phlepsius nigrifrons, n. sp.—Form of *denudatus* nearly, but larger. Resembling *Vanduzei* in general appearance, but slightly shorter and stouter. Length, 7 mm.; width, 2.75 mm.

Vertex convex in both diameters, rounding to the large inflated front, with a slight conical projection at apex. But little longer on middle than against eye. Front full, very broad at base, narrowing down to the parallel margined clypeus. Its length and breadth about equal. Elytra broad, compressed behind, venation obscure, resembling that of *Vanduzei*, but with the apical cells short.

Colour: vertex pale yellow in female, with a pair of round spots at base, and a small pair just back of apex black. The black on the rounding front is visible on either side the apex. In the male there is an arch of irregular dots connecting the basal spots, two or three dots inside the ocelli, and the frontal markings extend up to the apical spots. Front black at base, with faint, light arcs; below the antennæ it is pale yellow, with about five short brown arcs on either side. Pronotum and scutellum pale dirty yellow, more or less inscribed with fuscous. Elytra pale, with the nervures and the few scattered inscriptions brown; an interrupted black stripe starts beneath the margin of the pronotum, extends back just under the claval suture to the first cross nervure, and gradually fades out. This is especially marked on both sides of the first cross nervure, while the rest of these cells and the fork of the outer sector are milk white.

Genitalia: female segment wanting, or appearing as a pair of widely separated rectangular plates, a pair of roundingly pointed plates overlap these on their inner margins, leaving the median fourth exposed. Male valve rounding, with the apex bluntly produced; plates together nearly semicircular, with the apices bent up and slightly produced.

Described from a pair from the collection of the U. S. Nat. Museum, taken at Hot Springs, Ark., by Schwarz and Barber.

Paramesus immaculatus, n. sp.—Form of *Coloradensis* nearly, but smaller, and with a shorter, blunter-margined vertex. Pale tawny, with faint markings. Length, ♀ 4.5 mm., ♂ 3.5–4 mm.; width, 1.75 mm.

Vertex flat, very slightly sloping, anterior margin in a regular curve, about one-fourth longer on middle than against eye, anterior margin distinct, slightly acutely angulate, but not as sharply marked as in the other members of this genus. Front broader and shorter than in *Coloradensis* or in *Twiningi*. Elytra broad, rather short, venation as in *Twiningi*, but less distinctly marked.

Colour: vertex of a uniform pale tawny, sometimes with a faint submarginal line. Face pale creamy yellow, slightly washed with brown. Pronotum pale tawny, with more or less of a cinereous cast on disc.

Scutellum pale tawny and testaceous, in irregular mottlings. Elytra subhyaline testaceous, nervures scarcely darker except at apex, where they are sometimes distinctly fuscous. Some specimens from the higher altitudes lack the fulvous tinge, and have more distinctly fuscous nervures.

Genitalia: female segment rather long, slightly emarginate posteriorly, with a strap-shaped median tooth. Male valve very obtusely triangular, plates long triangular, about five times the length of the valve.

Described from sixteen specimens collected at Fort Collins, Palmer Lake and Rico, Colo., by the author.

Eutettix bicolorata, n. sp.—Form of *jucunda* nearly, slightly larger, and with a more prominent front. Front pale greenish-yellow, with black markings on pronotum and tips of elytra. Length, ♀ 6 mm.; width nearly 2 mm. Males slightly smaller.

Vertex rather narrow, but little wider than an eye, and only a trifle longer in the middle. Surface sloping strongly to the transverse depression. Front much inflated, meeting the vertex at a slightly obtuse angle, the margin distinct. As seen from the side the front is roundingly angled below the antennæ. Pronotum short, truncate behind. Elytra long, narrow, compressed behind.

Colour: vertex greenish white, four small dots on the anterior margin, and an irregularly reticulate square of black in the centre of each half of the disc. Face greenish white above, brown or fuscous below, sharply separated on a line just below the eyes, the darker colour running up on the sides to the antennal sockets. Pronotum heavily inscribed with black, omitting a narrow posterior margin, a row of irregular spots anteriorly, and three more or less definite stripes on the disc. Scutellum inscribed with brown, omitting three spots in an apical triangle. Elytra greenish straw colour back to the apex of clavus, the nervures concolorous. Back of the clavus the elytra are milky white, with the nervures and numerous reticulations black in sharp contrast. The apical portion of this area solidly infuscate, omitting a marginal line and a small hyaline spot in the third apical cell.

Genitalia: female segment long, posterior margin slightly produced in the middle and sinuate either side. Male valve short, transverse, plates long-triangular, the apices extended and margined with fine white hairs.

Described from one female from Hot Springs, Ark., H. S. Barber collector (U. S. N. M. Coll.), and four specimens taken by the author at Richfield, Utah.

NEW SPECIES OF NORTH AMERICAN LEPIDOPTERA.

BY WILLIAM BARNES, S.B., M.D., DECATUR, ILL.

(Continued from page 196.)

Stiria aliaga, n. sp.— ♂. Expanse, 30 mm.

Ground colour even chrome-yellow, a shade lighter beyond t. p. line. Small ochraceous spot at inner third of cell, one towards its outer end and traces of one beyond. These are about equidistant from each other. T. p. line the only other marking on fore wing. This is quite faint, ochraceous, wavy and cannot be followed to costa in the specimens before me. The fringe is darker than wing, of a somewhat "Ashes of Roses" colour. The costa is lightly tinged with the same shade and the posterior thoracic tufts and ends of patagia are likewise similarly coloured. The fringe has a narrow ochraceous line at base and a slightly paler mesial band.

Hind wings pale yellowish-white, fringe concolorous, with faint basal, slightly darker line. Beneath pale yellow. Fore wing from t. p. line to base and hind wing along costa darker, being coated somewhat thickly with chrome-yellow and reddish scales. Head and thorax pale brownish-yellow, abdomen, palpi and legs somewhat darker. Front crater-like with central protuberance.

Female similar to male, but somewhat paler, more of a canary yellow. The specimen is not so fresh as the male, however, which may account for the difference in colour.

Types ♂ and ♀. Pinal Co., Ariz.

Thalpochares Jativa, n. sp.—Expanse, 17 mm.

Ground colour light red, with a decided pink tinge. Base of wing yellowish-white, this extends from junction of costa and thorax obliquely downward and outward to inner margin, about 1½ mm. from thorax. The lower and inner half of this on inner margin, next to body, is, however, of the ground colour. The only other marking on the wing is a Y-shaped, yellowish-white band across middle of wing. The slightly expanded base rests on middle of inner margin. The fork is in the middle of the wing, the outer prong is slightly expanded on costa, while the inner is somewhat narrower and shorter. The space between the prongs is filled with the ground colour, though the edges are somewhat diffuse and not so sharply defined as the outer margins of the Y. The prominence of the mark is heightened by a slight intensification of the ground colour along its margins. The fringe is of a somewhat purer pink tinge at base, outwardly paler.

Hind wing pale yellowish, faintly tinged with pink, quite markedly so beyond a rather indefinite, incomplete, blackish mesial shade, fringe concolorous, paler outwardly. Beneath fore wing pink along costa and at apex, fading into a more yellowish tint towards inner angle. Yellowish along inner margin, blackish-fuscous centrally. The outlines of the Y mark can be discerned, though faintly. Hind wing yellowish, overcast with pink along costa and to a lesser degree along outer margin. Head, thorax and abdomen concolorous with wings. Palpi yellowish-white, slightly dusky outwardly. Thorax, legs and abdomen yellowish-white.

Type, 1 ♂, Southern Arizona.

Heterocampa Wymola, n. sp.—Expanse, 33 mm.

Fore wings from costa to median vein and narrow bands along outer and inner margins shades of light and dark gray, remainder of wing a dull brassy-yellow. Veins darkened with black scales. A dark apical patch running from apex to median vein, preceded by patch of lighter gray than rest of costal area. The gray on inner margin darker than on costal or outer margins. Only faint fragmentary indications of transverse lines can be made out. A narrow discal bar is in evidence in the male, doubtfully so in the female. A rather faint narrow marginal dusky shade. Fringe concolorous, darker outwardly and at ends of veins and with a well-marked black line at base. Hind wing of ♂ almost white, showing very slightly fuscous under lens. Of ♀ fuscous outwardly, with faint dusky mesial band.

Beneath fore wings dusky, lighter centrally and along outer margin. Hind wings in ♀ paler, fuscous along costa and outer margin. In ♂ as above. Fringe of both wings concolorous, with scalloped basal black line and black dashes through fringe at ends of veins. Head and thorax rather dark gray, the latter posteriorly and edges of patagia somewhat darker. Some metallic tipped scales on thorax and patagia, especially at their posterior parts. Abdomen yellowish-fuscous above and below. Thorax and legs gray. Tarsi checkered black and gray. Palpi smoky-brown, gray at tip. Antennæ gray above, yellow beneath, bipectinate in ♂ almost to tip; in ♀ serrate.

Types ♂ and ♀, Pinal Co., Arizona. From Mr. Poling.

Thyridopteryx Alcora, n. sp.—Expanse, 25 mm.

Head, thorax and abdomen jet black. Wings hyaline, very sparsely coated with black scales. Costal edge narrowly black, somewhat broader beyond cell before apex. Subcostal and median veins as far as end of

cell not covered with blackish scales, in the specimen before me thus appearing of a very pale yellowish tint, with their inner margins narrowly brownish-black. Secondaries along costal and inner margins quite thickly coated with blackish scales and hairs, but much wider along the latter Beneath as above. Antennæ brownish-black.

Type, 1 ♂. Santa Catalina Mts., Arizona, August 24th. Received from Mr. Poling.

Triprocis Yampai, n. sp.—Expanse, 19 mm.

Antennæ, head, thorax, base and tip of abdomen black. Collar superiorly and remainder of abdomen, dorsally and at sides, bright red. Fore wings dull brownish-black, with faint blackish lustre in certain lights. Thinly scaled. Beneath, head, thorax, legs and a broad band through centre of abdomen, black. Wings as above.

Types, ♂ and ♀. Babaquivere Mts., Ariz. Received from Mr. O. C. Poling.

Limacodes Oropeso, n. sp.—Expanse, 15 mm.

Ground colour a rather dark, blackish-brown, hind wings possibly a trifle paler. Head, thorax and fringe concolorous. Slightly paler at base of fringe, which also shows a very faint checkering under the lens. On fore wings there is a prominent white band, extending from just before apex to inner margin. This band is somewhat more prominent in some specimens than in others. In general it is broadest in the middle of the wing and dwindles almost or entirely out before reaching inner margin and to a less extent also before reaching costa. The outer border of the band, while it presents a rather even course, is somewhat jagged from the outward projections of the white scales along the veins. The inner margin is more irregular, being encroached on by the ground colour, especially opposite cell. There are usually two or three small patches of ground colour included in the broadest portion of the band below median vein. With the lens can be seen a light frosting of the wing with white scales beyond the band.

Beneath somewhat paler than above. On costa just before apex there is a fairly distinct patch paler than the ground colour, to the inner side of which the wing is slightly darkened. In just the right light, with a lens, the light patch is seen to be the inception of a much fainter light submarginal band, common to both wings, and the fringe can be seen to be faintly checkered. The body parts beneath are concolorous and the antennæ only a shade paler.

Types, Yuma Co., Arizona, March. Cochise Co., Arizona.

I am under great obligations to Prof. J. B. Smith for more perfect specimens of this interesting species than those I already possessed. I am rather inclined to think this species may form the type of a new genus, but prefer to place it here provisionally, leaving its final disposition to someone more competent than myself to examine it structurally.

Coccus luzena, n. sp.—Expanse, 24 mm.

Head, collar, patagia, thorax and fore wings evenly gray. Inner half of fore wing quite thickly covered with transverse blackish strigæ. In the outer half these have a tendency to be more reticulated. A rather heavy black band from middle of costa downward and outward, dividing into two or three prongs just before reaching inner margin. Two similar though less heavy lines leave costa between inception of median line and apex. These unite and proceed as a single line for a short distance and then divide into two or three branches just before reaching inner angle.

Hind wings gray with a somewhat reddish-brown tinge. Beneath fore wings gray, somewhat reddish-brown centrally, hind wings gray, both wings reticulated with black, the inception of these on costa of fore wings being especially pronounced. Thorax gray, abdomen greasy, but apparently gray. Legs gray, tarsi banded with black.

Type, 1 ♀. Huachuca Mts., Arizona.

ON THE SPECIFIC VALIDITY OF INCISALIA HENRICI.

BY JOHN H. COOK, ALBANY, N. Y.

For many years I have collected diurnal Lepidoptera in the neighbourhood of Albany, N. Y., making a special study of established varieties, sports, and minor vatieties within the species.

Among the *Lycænidæ* the forms which have proved of greatest interest from this point of view are those embraced in the genus *Incisalia; I. irus* in particular has afforded abundant material for investigation, and long ago I was enabled to recognize several tendencies in the distribution of colour over both the wings and body, which made it possible to separate this species into groups or form-series. These variations appeared in both sexes, and, as it then seemed, without any indication of tendencies peculiar to either. As an illustration of the danger accompanying the unqualified acceptance of a generalization, I may state that, after having satisfied myself with regard to the character of the discal stigma of the male, I made use of this as a criterion of sex.

In May, 1904, my brother, Mr. Harry Cook, called my attention to the fact that some of the males (as proclaimed by the genitalia) were *without the stigma*. As many specimens were taken as the lateness and unfavourableness of the season permitted, and all the material collected in former years was again carefully sexed. This resulted in a complete readjustment of the previously accepted form-series, and brought order out of chaos (at least among the males).

Correlated *in every instance* with the absence of the discal stigma are characters which clearly distinguish these males from typical *irus*. The most striking are: (1) the uniform blackish-brown of the basal half of the secondaries beneath; (2) the definiteness of the boundary of this area and its almost equal projection between the median nervules (in *irus* this projection is constantly greater between the second and third than between the first and second); (3) the continuity of the extramesial line running from the costal margin of the primaries—under surface—to the first median nervule (in *irus* this is represented by a series of short dashes between the nervules, which, being at different distances from the outer margin, give the appearance of a much broken or crenulate line). I moreover failed to find any androconia at all on the individuals without the stigma. There are other differences between the two series quite as noticeable, but not constant enough to serve as distinguishing characters.

On a basis of the three constant and best differentiated characters of the males, the females were separated very satisfactorily, and in their turn exhibited correlative differences of minor importance.

The above generalizations are made from sixty-three specimens.

It is to be noted that the series thus removed from *I. irus* agrees in detail with the description of *I. Henrici*, as published by Grote and Robinson in 1867 (Trans. Am. Ent. Soc., I., 174). Scudder has sunk *Henrici* as a synonym; Dyar retains the name, regarding the forms as distinct.

The original description fails to mention the stigma, although it seems reasonable to believe that the absence of so obvious a mark would have attracted the attention of two such experienced observers as the authors, especially since its absence from the ♀ of another species is remarked in the same paper (p. 173).

Edwards, who bred what he thought to be a *Henrici* (Papilio, I., 150–152)—the description of the early stages of which has since passed, with many, for a description of the early stages of *irus*—was certainly

unaware of such a distinction, and his statements here and in the American Naturalist (XVI., p. 173) may refer to either *Henrici* or *irus*.

Holland mentions the rusty suffusion of the upper surface as one point of distinction, and figures a well suffused ♀. This character is thoroughly unreliable because inconstant, relative and balanced by similar suffused individuals of *irus*. Nevertheless, it has been used as a criterion by many, and there is a specimen in the collection of the late J. A. Lintner labelled *T. irus*, var. *Henrici*, which is an undoubted ♂ *irus*.

The characters, then, separating the two series seem to be of sufficient importance to warrant their recognition as distinct species, at least until the test of breeding can be applied. I have been unable to discover any difference in the genitalia, but this fact hardly militates against the position taken, as one needs a long series and a good imagination to discriminate between the genitalia of any of the recognized species of this genus.

The earliest record of the capture in this vicinity of *I. Henrici* which I have is May 28, 1890.

A NEW SPECIES OF BUCCULATRIX.

BY MARY E. MURTFELDT, KIRKWOOD, MO.

Bucculatrix Ainsliella, n. sp.—Antennæ about three fifths the length of the fore wings, annulated in dusky brown and dull yellow. Eye caps golden white, expanded. Apical tuft long, projecting forward, dark brown in centre, shading outwardly to dingy white. Face satiny cream white. Thorax cream white, more or less dusky, overlaid with dark brown scales, with small but distinct dark brown spot on centre of dorsum, two rather narrow marks of same colour forming a triangle or open V on posterior joint, back of which is a silvery white band. Forewings: ground colour shining cream white, more or less obscured by dark brown scales, which in some lights exhibit purplish reflections. The pattern, which, though less deeply shaded in some specimens than in others, is quite unvarying, consists of a dark brown longitudinal band from the base along the costa, gradually broadening and intensifying to the apical third, where it narrows and curves backward, leaving the anterior margin to the apex merely speckled with the dark scales. The inner margin to beyond the middle is but sparsely irrorate with brown, but has, just below the cell, a conspicu-

ous purple brown spot curved on its upper edge, but straight on the margin of the wing, so that when the wings are closed it presents the appearance of a broad oval patch, one half of which is on one wing and the other half on the other. Fringes corresponding in colour and suffusion with the body of the wing. Hind wings pale silvery gray, the fringe tinged with brown. Abdomen iridescent gray, terminating in pale brown tuft. Tibiæ of posterior legs clothed with long buff-coloured hairs.

Alar expanse from 7 to 8 mm. The pupæ are sooty black, and before the moths issue are protruded about two-thirds of their length from the cocoons. Described from numerous bred specimens. I have great pleasure in naming this pretty species after Mr. Charles N. Ainslie, of Rochester, Minnesota, from whom I received the cocoons early in the winter, indirectly through the kindness of Prof. Webster, and later by a consignment direct from Mr. Ainslie. The cocoons are white, and about the size of those of the Ribbed Cocoon-maker of the apple (*Bucculatrix pomifoliella*, Clem.), which, though somewhat less distinctly ridged, they quite closely resemble.

"These cocoons," Mr. Ainslie writes, "are everywhere this winter, but most plentiful in woods, attached, as you see, to leaves and to moss setæ and grass blades at the base of the trees—the black oaks seeming to have more on and around them than other trees."

Some of the leaves received from my correspondent had attached—generally to the under surfaces—crowded groups of from twenty to thirty cocoons, and on many of the grass blades were double rows from one and one-half to two inches in length.

The past year seems to have been the first in which this insect attracted attention, but occurring in such numbers, it is not impossible that it may become seriously injurious. Mr. Ainslie informs me that he has bred five distinct parasites from the cocoons, but as yet these are in too small a proportion to the host insects to act as much of a check upon them.

The *Bucculatrix* above described was submitted to Mr. August Busck for identification, and was by him pronounced distinct from any species in the collection of the National Museum, and he therefore advised the publication of a description.

ENTOMOLOGICAL SOCIETY OF ONTARIO.

British Columbia Branch.

It is with much gratification that we announce the formation of the British Columbia Branch of our Society, which has been accomplished by the affiliation with it of the British Columbia Entomological Society. The Rev. G. W. Taylor, of Wellington, is the President, and Mr. R. V. Harvey, the Queen's School, Vancouver, Secretary-Treasurer. Regular quarterly meetings are held and eighteen members have thus far been enrolled. With such a goodly band of enthusiastic and experienced entomologists the new Branch ought to grow and prosper and do much efficient work for the furtherance of this department of science in the western Province of the Dominion of Canada.

Montreal Branch.

The thirty-second annual meeting of the Montreal Branch was held in the Natural History rooms on Monday, May 8th, at which 16 persons were present.

The Council, Librarian and Curator, and Secretary-Treasurer, submitted reports showing that the Society had made progress during the past year.

The following officers were elected: President, A. E. Norris; Vice-President, Geo. A. Moore; Secretary-Treasurer, A. F. Winn, 247 Elgin Avenue, Westmount; Librarian and Curator, Charles Stevenson; Council, E. Denny, L. Gibb, H. H. Lyman, G. Chagnon.

CHANGES OF ADDRESS.

Mrs. Annie Trumbull Slosson, from 23rd Street to 83 Irving Place, New York.

Prof. F. M. Webster, from Urbana, Ill., to U. S. Department of Agriculture, Washington, D. C.

Mr. W. D. Kearfott wishes all mail matter to be addressed to him at Montclair, N. J., not Liberty St., New York.

Errata.—Page 185, May No., 8th line from top read "pupæ" instead of "papæ"; 18th line from top read "find any description of the larval stage of *Delphastus pusillus*, Lec." instead of "find any description of *Delphastus pusillus*, Lec."

PRELIMINARY LIST OF THE MACRO-LEPIDOPTERA OF ALBERTA, N.-W. T.

BY F. H. WOLLEY DOD, MILLARVILLE, ALTA., N.-W. T.

(Continued from page 184.)

(339. *Leucania anteroclara*).—Specific characters in this genus are often by no means strongly marked, and though they may be on the whole fairly constant, are, as Prof. Smith expresses it in the "Revision," hard to locate in words. *Anteroclara* seems to be, at any rate, a pretty well marked form, but when its range of variation in this locality is known, specimens are to be found closely approximating no less than six different species, or, at any rate, forms standing under six different specific names, viz.: *commoides*, *multilinea* (Calgary form), *phragmitidicola*, *Calgariana*, *farcta* and *roseola*. I have good series of all of these except *farcta*, and have made very careful comparisons. It is only the very darkest specimens, and most of those ♀ ♀, that are really at all like *commoides*, but the darkest streakings are never really black as in that species, the upper margin of median vein not dark bordered, and the secondaries never as dark either. From eastern *multilinea* the darker secondaries separate it at once, and the differences from what I call the Calgary form of that species are discussed under that head. Viewed as a series, it is less like *phragmitidicola* than Prof. Smith's comparisons had led me to suppose. Of this I have critically examined about a hundred specimens from various parts of the continent, including a few from Texas, a ♀ from Aweme, Man., and another from Utah. The dark bordering above median vein mentioned in the "Revision" I find rarely prominent, frequently lacking, and with the exception of the pale median vein and the dark bordering below it, this species is as a whole more even in colour and not more streaky than some of my darkest *anteroclara*. *Anteroclara* varies from pale luteous, or creamy-yellow to a pale oak-brown. *Phragmitidicola* has much the same shade as a base, but is always washed throughout with a faint, uniform, pale brick-red or fawn-brown, which *anteroclara* lacks, and has usually a sparse sprinkling of blackish or dark grayish scales as well. The t. p. line in *anteroclara* when present is reduced to dots on veins 2 and 5, but very occasionally faintly traceable throughout. In *phragmitidicola* it is more often traceable by dots about equally prominent on veins 1 to 6, but may occasionally in the very palest specimens, which seem to come very near *farcta*, be obsolete. The secondaries in *phragmitidicola* are much whiter than in *anteroclara*, and are more like the local form of *multilinea*, but if

anything with less of a smoky border and have a more silky vestiture. The nearest point from which I have seen *phragmitidicola* is Aweme, Man., Mr. Criddle having kindly lent me a ♀ from that locality. Though paler than the average run of the species, it is pretty well matched with a Texas specimen, as well as with one from New Brighton, Pa., and fits into the series without question. Notwithstanding Prof. Smith's suggestion of a local form, I believe that they are really distinct. Of *farcta* I have seen but two specimens that fit the description in the "Revision," and both are from California. One is too poor to be of value for comparison. The other, in the collection of Mr. Merrick, is more like a very pale *phragmitidicola* than any *anteroclara*, but lacks the dark shading to median vein. *Farcta* is the name under which I used formerly to send out *anteroclara*. *Anteroclara* is recorded also from Wyoming, Colorado and Oregon. Vancouver is also mentioned on page 174 of the "Revision," not under the description.

340. *L. Calgariana*, Smith.—Rare. Described from here. The type is at Washington. Probably only a variety of *anteroclara*, which it exactly resembles, with the addition of a rich reddish tinge throughout. In the absence of any real intergrades, however, it must still be treated separately until proved the same by breeding. From *phragmitidicola* it differs, as does *anteroclara*, by the less even coloration and darker secondaries, and the less prominent dark shading below median vein. I have compared a good series of *roseola* from Kaslo, B. C., and other places west of the Rockies, and they differ from *Calgariana* in having paler secondaries, being less streaky, and lacking the dark shading beneath median vein. In his Kootenai list, however, Dr. Dyar says that some of the darkest Kaslo forms have a faint dark shade here, but "are all far less brightly marked than the types of *Calgariana* and cannot be confused with it." The reddest specimen I have seen comes from Victoria, B. C., and is much redder than most of my *Calgariana*, but is less streaky; in other words, more even in colour. Another specimen, from Vancouver Island, has a distinct dark shading, not below, but above and beyond median vein. Both these latter specimens are in the collection of Mr. F. A. Merrick. Although all the *roseola* I have seen lack the slight grayish powdering and conspicuously pale but dark bordered median vein of *phragmitidicola*, besides being different in tint, I am inclined to consider the form a nearer ally of that species than of *anteroclara* or *Calgariana*.

341. *Himella infidelis*, Dyar? (Can. Ent., XXXVI, p 32, Feb., 1904). —A ♂, taken by Mr. T. N. Willing at Lethbridge, Alta., on July 11th, 1904, in perfect condition, Prof. Smith tells me is probably this species. *Infidelis* was described from Kaslo, B. C., and from Turtle Mts., North Dakota, and stated to be "between *contrahens*, Walk., and *conar*, Streck., with the discal spots of the former, and the diversified ground colour of the latter." I have the same species from Regina, Assa.

342. *Tieniocampa subterminata*, Smith.—Common. End April and early May. At sallows. The usual colour here is a slightly reddish ashen-gray, and though the species varies to a deep brown-red, the ashen-gray ground is seldom entirely obliterated. It was a surprise to me to find recently that this species had formerly been confused with *alia*. The two are, with rare exceptions, so unlike, that comparison seems almost superfluous, but one of the chief differences by which they seem to be generally known is not quite constant. Under the description its author states that whilst in *alia* the s. t. line is *preceded*, in *subterminata* it is *followed* by a darker shade. This is quite correct in the main, but the darker shade, which is a mere bordering to the s. t. line, is occasionally absent in both species, though, of the two, less frequently in *alia*. As a matter of fact, a constant character to separate them is hard to find, though the difference in appearance is obvious enough. *Alia* has never the even ashen-gray ground so common to the present species, and though a dark gray ground may sometimes exist, there seems to be invariably a distinct mottling or peppering throughout of red, ochreous, and brown colours, present in *subterminata* only as a shading. Sir George Hampson has had the species from me, and says that it is synonymous with *revicta*, Morr., though the type of that species does not appear to be in the British Museum. Prof. Smith had never seen *revicta* that he recognized up to the date of publication of his Catalogue. I have seen a copy of the original description of *revicta*, and with a long series of Calgary *subterminata* before me, can easily believe that a certain combination of the ordinary variation of several characters occurs, which fits it in every detail. The most important character of *revicta* is stated to be the black subterminal line. In *subterminata* the dark posterior shade bordering the s. t. line is sometimes distinctly black (though not necessarily, as stated in the description, in the darkest specimens), and in one of my examples, while the black bordering is very conspicuous, the pale line itself is almost obsolete.

343. *T. alia*, Gn.—Common. End April and early May. Sallows. Prof. Smith states in his Revision concerning *alia*: "It is a very constant species." Compared with its European congener and near ally, *incerta*, it most assuredly is, but in this district at any rate the variation is considerable. Judging from specimens received from Wellington, B. C., and from Cartwright and Aweme, Man., supposed to be authentic, I probably have true *pacifica* at Calgary, but so far I have quite failed to draw any line between them, though I tried hard to separate my local series into two species before I had any idea what *pacifica* was like. The original description of the latter says that it "differs by its thinner squamation, its more obscure tint, and the narrower black-filled reniform..... In size the species is like *T. alia*, while the ornamentation is very similar." In his Revision, Prof. Smith says: "*Alia* is less robust, the thoracic clothing less dense, while the wings are apparently more heavily clothed with scales," whilst he separates them tabularly in giving an even s. t. line as characteristic of *pacifica*, and a sinuate one of *alia*. He says also, "*pacifica* is difficult to separate from *alia* on colour characters." I have a series of *alia* from Chicago which are not separable from the common form occurring here. The two ♂ ♂ sent me by Dr. Fletcher from Wellington, B. C., as *pacifica*, and stated to have been carefully compared with specimens named by Prof. Smith, seem perhaps to have very slightly denser thoracic vestiture, but except that one of them is of a much richer red, I cannot see that they differ specifically from some of the darkest of the Calgary series, some of which have just as even a subterminal line. The Manitoba specimens fit into the same series, which I cannot divide into two by colour, s. t. line, or any other character or combination of characters. If two species really exist, it would seem that they require placing on a firmer basis than at present.

344. *Stretchia plusiiformis*, Hy. Edw.—Very rare. Light. I have a ♂ without abdomen, dated April 25th, 1894, and a ♀, May 1st, 1895. It has not been seen here since the latter year.

345. *Cleoceris populi*, Strk.—The larvæ appear to be common, though local, on *Populus deltoidea* or *P. balsamifera*, I am not sure which. They spin leaves together as a hiding-place for the daytime. I have bred a considerable number, and find that the variation is enormous. I have nothing nearly as white as Dr. Holland's figure, but the colour varies from a pale bluish ashen-gray without contrasts to dark blackish gray, with still darker lines, bands or blotches across the inner half of the

wing. With the exception of one specimen, taken at light, there are always very distinct shades of olive green or brown of varying intensity on different parts of the wing and on the collar. In some specimens a broad central band of rich olive brown is the most conspicuous mark. Pupation commenced during 1904 on June 25th. The duration of emergence seems short, and all my specimens, numbering nearly sixty, emerged, usually between 4 and 9 p.m., between July 30th and Aug. 4th. In 1902, the only other time I have bred it, the few I had hatched in about the same time, but a week later. Only two specimens have been taken besides those bred, at light, Aug. 16th and Sept. 27th, 1903. Both are in perfect condition, and that taken on the earlier date is normal. The Sept. 27th specimen shows such very slight traces of the olive shading that I at first overlooked the existence of any, and felt sure it was a different species. However, it agrees in every other detail with specimens subsequently bred. An attempt to bleach out the olive shade from bred specimens by long exposure to sunlight has failed, but it may be that exposure to the weather when alive may have this effect. The apparent retiring habits of the insect would account for its otherwise good condition at so late a date.

346. *Lithomoia germana*, Morr.—An extreme rarity until 1903 and 1904, during which seasons it has been common at treacle. Middle Aug. and Sept.

347. *Xylina amanda*, Smith.—Rare at sallow blossoms. End April and early May. I formerly had this as *petulca*, but it is not compared with that species *(signosa)* in the description. Described partly from Calgary material, and appears to be widely distributed over the continent. The type is from Winnipeg, and is at Washington. The figure given with the description in Prof. Smith's Revision of Xylina (Trans. Am. Ent. Soc., XXVII., pp. 1–46, Aug., 1900), gives a good idea of the species, though the left wings of that specimen are in a bad light. I have the same species from Aweme, Man., sent me as *contenta*, but not agreeing with figure or description of that in the Revision.

348. *X. fagina*, Morr.?—A ♂, taken by Mr. Gregson at Lacombe, Alta., on September 1st, 1900, has been doubtfully so referred by Prof. Smith, who writes: "A specimen from Cartwright, Man., is intermediate between this and normal *fagina*. I am not so certain that this will not prove new when plenty of material is at hand." He had seen the specimen before and labelled it "*holocinerea ?*" A similar ♀ was taken here

on Sept. 6th, 1904. They differ from anything else in my collection, and seem to agree with the figure and description of *fagina* in the Revision.

349. *X. Oregonensis*, Harv.—Prof. Smith says he has a specimen of this species in his collection which comes from me. I have a Calgary specimen dated April 23rd, 1895, which stood for years in my collection as *Georgii*, a name I have certainly had given me, though not to that specimen, which, judging from the description in the Revision, is probably *Oregonensis*. However, it seems that of the older species, *emarginata*, *holocinerea*, *Georgii*, *puella* and *Oregonensis*, are all very much alike, and to these I believe may now be added *Fletcheri*, *ancilla* and *vertina*. *Holocinerea* should occur at Calgary, as Winnipeg, Man., and "N. W. British Columbia" are amongst its original localities. I have a Manitoba series received as *Georgii* and *holocinerea* which I cannot separate into two species, nor distinguish from my Calgary specimen. The shape of the orbicular would seem to be an unsafe guide in separating species in this group, as I notice it often varies considerably in the two wings of the same specimen.

350. *X. ancilla*, Smith.—(Psyche, June, 1904, p. 57). Described from Calgary, Cartwright, Man., and Wellington, B. C. The ♂ type is from Cartwright, and the ♀ from Wellington. The Calgary specimen is a ♀ co-type in my own collection, dated Sept. 18th, 1899, and I have one other Calgary ♀, Sept. 18th, 1898, and a similar specimen from Cartwright, Man. The description says: "Allied to *Oregonensis*, Harv., but of a very dark blue gray, with much less contrast, and inconspicuous maculation. The scant material indicates a considerable range of variation, and that the more uniform examples may be confused with well-marked *Georgii* or *holocinerea*." My three specimens look distinct from anything else here listed.

351. *X. pexata*, Grt.—A single specimen dated April 29th, 1895, has been thus named by Prof. Smith, and is not unlike his and Dr. Holland's figures of that species. It has lost an abdomen and both hind wings in the mails.

352. *Litholomia napæa*, Morr.—Common. Sept. to early Oct., and after hibernation from March 29th to May 30th. The first noctuid seen in the spring.

353. *Calocampa curvimacula*, Morr.—Two specimens at treacle, Sept. 27th, 1903, and one more the following fall.

354. *C. nupera*, Lint.—Rare. I have records (except during the winter) for every month except July.

355. *C. cineritia*, Grt.—Common. Sept. (treacle) to early May (sallows). Also at light. Rather a variable species, and I think I have both the forms referred to and figured by Dr. Ottolengui in Journ. N. Y. Ent. Soc., X., pp. 77 and 78, and Pl. X. (June, 1902).

356. *Cucullia montanæ*, Grt.—Six or seven specimens, July, apparently all in 1899. Typical form according to Prof. Smith.

357. *C. similaris*, Smith.—A single ♂, taken by Mr. C. Garrett, on Fallen Timber Creek, about 20 miles west of Didsbury, Alta., is apparently distinct from anything in my collection, and has been named by Prof. Smith "*similaris*, paler than typical and with less yellow." In maculation the specimen resembles *montanæ* almost exactly, but the colour of primaries is much more like *indicta*.

358. *C. indicta*, Smith.—(Can. Ent., XXXVI., 154, June, 1904). Described from here. The ♀ type is in Prof. Smith's collection, and, unless my notes err, bears label, "Head of Pine Creek, July 29th, 1896," which means that it was taken not far from my house, at about the western limit of the prairies. The ♂ type is in my own, and was taken in the true foothills on Sheep Creek, and about twenty miles nearer the mountains. Another Pine Creek ♀ is dated July 21st, 1903. I had held this species as probable *florea*, whilst believing my *florea* to be either a form of *asteroides* or a new species. The discoidal spots are even less evident than in my *postera*, the mark at anal angle is not so distinct, and there is an entire absence of any reddish brown shading, or obviously darker costal margin. My ♀ has a dark smoky suffusion throughout. I considered it identical with the ♀ type, but without Prof. Smith's opinion I felt doubtful as to whether the ♂ was of the same species. The description says: "The relation is with *postera*, but all the brown has disappeared, and the maculation is almost gone with it."

359. *C. postera*, Gn.—Rare. Middle July to middle Aug. I have eight specimens in my collection which I believe to be referable to this name, though all but two are more or less worn or defective. A perfect ♂ and rather worn ♀ have been returned as *postera* by Prof. Smith. It resembles *asteroides*, which I have from Chicago and Columbus, Ohio, as to the primaries, but the maculation is as a rule less distinct, and the secondaries are smoky throughout instead of pure white in the basal half or two-thirds. It might easily be confused with *florea*.

360. *C. florea*, Gn.—Not common as a rule, but over thirty specimens were taken during 1903. At light, and "hawking" at flowers at dusk.

Middle June to early Aug. The comparative frequency of this species during 1903 has at last enabled me, with Prof. Smith's aid, to arrive at something like a satisfactory conclusion in what has for years past seemed a matter unapproachable from lack of material. Prof. Smith had seen a few specimens from me on more than one occasion, and had designated different individuals, but doubtfully, as *montanæ* and *asteroides*, but expressed the opinion that all the specimens might after all be of one and an undescribed species. He had, however, already named true *montanæ* for me, which is totally different in colour, with the ground extremely pale, scarcely bluish, and contrasting strongly with the sienna-brown costa and inner margin, and with what I should call a sienna tint throughout. During the winter of 1903–4 I received the species as *florea* from Mr. E. F. Heath, of Cartwright, Man., who stated that it was common with him, and that he had repeatedly sent it out as *florea* unchallenged. I rejected the name, pointing out to him that the description of *florea* in Prof. Smith's "Revision of Cucullia" (Proc. U. S. Nat. Mus., XV., 44, 1892) said "Primaries.....without red or brown shades." It was this and "the costa hardly darker" which had caused me to label my *indicta* tentatively as *florea*. I called Prof. Smith's attention to the fact, at the same time sending him a series of Calgary specimens. He wrote: "It is a question of colour estimates. Closely analyzed, you are correct; but in *florea* the general ground is so much darker (*i. e.*, than in *postera* and *asteroides*) that the reddish shading is not so obvious. I admit, however, that I would not have written as I did with the series I have now." The species is nearer to *postera* than anything else I have, but the ground is darker as a rule, and the maculation much more distinct. In *postera* the dark costal shade does not diffuse itself below the subcostal vein, as it usually does in *florea*, especially between the discoidals and near the apex. *Florea* resembles *asteroides* in this respect. I do not refer to the paler reddish shade, which in all three species extends to the median vein. In pale specimens of *florea*, if the discoidal spots are not distinct, the resemblance is close to *postera* with the maculation very well marked, and worn specimens are almost impossible to separate. My dates for the two would seem to show that *florea* appears a little earlier than *postera*, and this, as well as the entire absence of *postera* during 1903, when *florea* was common, supports my belief that the two series in my collection are distinct. As to

the primaries, *asteroides*, in colour and distinctness of maculation, is about intermediate between the two, but is sharply distinct from both by having white secondaries in basal half at least. I have specimens which I don't think I could separate from either by primaries alone. In the most *postera*-like specimens of *asteroides*, *i. e.*, with the maculation indistinct, if there is a tendency towards the lightening of the costa and reddish shade as well, the resemblance is to *indicta*. Specific characters in this genus are often slight, and I am very glad to have at last succeeded in procuring a good long series—about 50 specimens—of *florea* for a basis for study in this group.

361. *C. Speyeri*, Lint.—A single ♀, dated July 24th, 1898, answers to the description in Prof. Smith's Revision, and is very like Dr. Holland's figure of the species. I have a similar ♂ from Volga, S. Dak.

362. *C. intermedia*, Speyer.—Rather rare. Middle June and July. I have specimens that have been named both *intermedia* and *cinderella* by Prof. Smith, but am quite unable to distinguish between them. Examples from Manitoba, Ontario and Massachusetts do not in any way differ from average Calgary specimens. In a few of the local series, however, there is a slight tendency for the secondaries to become whitish basally. Sir George Hampson's note on specimens I sent him was; "New to us, but I think = *Speyeri*, Lint." It is not the same as the preceding species.

363. *Rancora albicinerea*, Smith —(Can. Ent., XXXV., 137, May, 1903). Described partly from Calgary material, partly from Manitoba. The type is from Calgary, and is at Rutger's College. A few specimens were taken at sallow blossoms between April 24th and May 5th, 1895, and I fancy only one or two have been seen since. I have a ♂ and two ♀ ♀, all slightly defective, but not a bit rubbed. Prof. Smith originally named this species *strigata* for me. By the primaries I should certainly have taken Dr. Holland's figure of *solidaginis* for my species, but it is of a ♀, and in *albicinerea* ♀ the secondaries are rather dark smoky, and in the ♂ darker than in that figure.

364. *Nonagria subflava*, Grt.—A single ♀ taken by Mr. Hudson on the edge of Red Deer Lake (between Fish Creek and Pine Creek), on Aug. 6th, 1901, unfortunately spoilt in the taking. I have often, both before and since, searched in vain for signs of larvæ of Nonagrias in reeds

and the larger grasses. I don't think *Typha* grows here at all.. I certainly never saw it.

365. *Tapinostola orientalis*, Grt.—Two ♂ ♂ at light, Sept. 3rd and 5th, 1904. "Darker than usual," according to Prof. Smith.

366. *Hydræcia Americana*, Speyer.—Fairly common at treacle. Aug. and Sept. I have specimens with the reniform both white and orange, but do not know to which of the varieties described by Prof. Smith they should be referred.

367. *H. medialis*, Smith.—Rare. Middle Aug. to early Oct. Treacle, light, and sometimes disturbed from hay-cocks, etc., in daytime. Mr. H. H. Lyman states (CAN. ENT., XXXVII., 30) that a Calgary specimen in the British Museum is the form named *pallescens* by Prof. Smith. I have not seen Prof. Smith's Monograph of Hydræcia, but note that Dr. Dyar does not list the two names as distinct. My six specimens show considerable variation in shade of colour, but I have never suspected two species.

368. *Papaipema impecuniosa*, Grt.—Two ♂ ♂ and a ♀, bred from larvæ found feeding in stems of Cow Parsnip *(Heracleum lanatum ?)*, close to the Red Deer River, about 50 miles north-east of Gleichen, in early July, 1904. The moths emerged from 14th to 16th August. They appear to be the same species as Dr. Holland's, Pl. XXVI., fig. 5, which, however, is there stated to represent *inquæsita*. The figure is declared by Mr. C. J. Smith, in Ent. News, XV., p. 221, to be that of *impecuniosa*, and I have since had this statement corroborated by Prof. J. B. Smith and Dr. Dyar. A specimen from New Brighton, Pa., is slightly darker than the local specimens.

369. *Pyrrhia exprimens*, Wlk.—Very rare, and only taken during two seasons, June 28th to July 12th. Treacle and flowers at dusk.

370. *Xanthia flavago*, Fabr. Fairly common at treacle some years. Middle Aug. to middle Sept.

371. *Cirrædia pampina*, Gn.—Sometimes common at treacle. Middle July to early Sept.

372. *Scoliopteryx libatrix*, Linn.—Rather rare. Have taken it in good condition at treacle in May and June, and from August until well into the winter, at the latter season hibernating in root cellars, etc.

(To be continued).

A NEW NORTH AMERICAN TAENIORHYNCHUS.

BY C. S. LUDLOW, M. SC.

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From the heart of the Sierras, in California, comes a new mosquito of the genus Taeniorhynchus, which is here described :

Taeniorhynchus Sierrensis, n. sp.— ♀. Head brown, a median line of white curved scales extending up between the eyes, immediately followed laterally by a patch of flat brown scales, a narrow white stripe laterad, followed by a brown stripe, narrow white line around the eyes, white forked and curved scales on the occiput; the general effect is of two brown submedian spots, and the curved scales are confined to this comparatively narrow median line; antennæ brown, and while not really banded, giving the effect of white bands, verticels brown, pubescence white, basal joint white scaled; palpi brown with white tips, and a narrow light band about midway; proboscis dark brown; clypeus brown; eyes brown.

Thorax brown, with fine tomentum, resembling the "frost" on some Anophelina, partly denuded, but sparsely covered with brown and white curved and spindle-shaped scales, the white scales being apparently mostly on the outer parts of the mesonotum, *i. e.*, cephalad, on the sides, and a heavy median bunch just in front of the scutellum; prothoracic lobes brown, with white curved scales; scutellum brown, such scales as remain are white curved and spatulate; pleura brown, with heavy patches of broad white scales; metanotum brown, nude.

Abdomen brown, with basal white lateral spots and basal white bands, thickened on the median line, which do not always reach all the way across, and on the penultimate segment is merely a median white spot; some segments also narrowly apically banded, apical hairs brown; ventrally mostly light scaled, and on the distal segments arranged so as to form both basal and apical bands.

Legs: coxæ and trochanters brown, with light scales; femora dark, slightly speckled with white scales, the dorsal sides the darker, but on the hind legs light at the base; small white knee spot on all the legs, a little more pronounced on the hind legs; tibiæ dark, sometimes a little speckled; metatarsi on all the legs with basal and apical light spots, which are very faint, sometimes missing on the fore legs and develop into well-marked basal and apical white bands on the hind legs; the fore legs are of lighter brown and the banding often very faint or missing; 1st and 2nd tarsal joints on the hind legs with apical white bands, on mid and fore legs only

the 1st tarsal have apical white spots, and in the fore leg they are very indistinct; remaining joints brown; ungues simple and equal.

Wings covered with brown typical *Taeniorhynchus* scales; 1st submarginal cell nearly a half longer and a little narrower than the 2nd posterior, the stems nearly the same length; supernumerary cross-vein slightly shorter and slightly interior of the mid cross-vein, the posterior about the same length as mid and a little more than its own length distant; halteres light. Length, 6 mm.

Male is very like the female; palpi nearly as long as the proboscis, the ultimate joint small and basally white banded, the penultimate also basally white, otherwise the organ is brown, and is not plumose. Length, 4 mm. *Habitat.*—Sierra Nevada Mts., California.

Described from several specimens sent from Three Rivers (?), Cal., by Dr. E. J. Bingham, 1st Lt., Asst. Surg., U. S. A. The thoracic scaling at first suggests *Culex triseriatus*, Say, but the abdominal marking and the banded legs carry it away from that, and besides that the wing scales are distinctively *Taeniorhynchus* scales.

CRIOCEPHALUS OBSOLETUS, Rand., AND ASEMUM MŒSTUM, Hald.

Abbé Provancher in his work on the Coleoptera of Canada, page 585, gives a brief description of an insect he calls *Criocephalus obsoletus*, Rand., and adds that it is very common.

After a careful reading of his description, I have come to the conclusion that it can not apply to *Criocephalus obsoletus*, but to *Asemum mœstum*, a common longhorn throughout eastern Canada. *C. obsoletus* is a much rarer insect in Canada, and, in fact, I have no record of its having been captured in the Province of Quebec; it is not even mentioned by Mr. Harrington in his list of Ottawa Cerambycidæ.

The two genera are decidedly very different, and cannot be mistaken one for the other. The eyes are finely granulated and hairy in *Asemum*, while the contrary is the case in *Criocephalus*. The antennæ are also longer in the latter genus and the body more elongate.

I found *Asemum mœstum* in great numbers at St. Hilaire, Que., on 24th May, 1903, under the bark of pine stumps. The only specimen of *C. obsoletus* I have comes from New Mexico—a very southern locality for this insect.

G. Chagnon, Montreal.

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PRACTICAL AND POPULAR ENTOMOLOGY:—No. 7.

Granary Insects.

BY ARTHUR GIBSON, CENTRAL EXPERIMENTAL FARM, OTTAWA.

Every year, in the United States and Canada, thousands of dollars worth of stored grain is ruined by granary insects, chiefly of three species. These are all well known, and much has been written concerning their habits and the methods by which they can be destroyed. Besides the three very injurious species, the Granary Weevil, the Rice Weevil and the Angoumois Grain Moth, which are responsible for most of the damage done, there are a great many other kinds of insects which do serious harm to stored grain and various other edible products. All of these insects are spoken of popularly as "weevils," but the only true granary weevils are the two mentioned above.

The power of granary weevils to destroy grain, when held for any length of time in stores or warehouses, is enormous. These insects are not natives of North America, nor is it at all likely that they will ever increase sufficiently in Canada, where we have such cold winters, to do very serious injury. It is true they occasionally destroy samples or small quantities of grain kept in heated offices or stores, but this injury cannot compare with their ravages in hot climates, particularly in India and South Africa. In the Southern States they do an enormous amount of damage every year, and it has been estimated of Texas alone that there is an annual loss of over a million dollars. Grain infested by these insects loses in weight, is useless for seed, and is unfit for consumption by human beings or live stock.

The Granary Weevil (*Calandra granaria*, L.).

This beetle, as well as the two other insects mentioned in this short article, has long been known as a serious enemy to stored grain. When mature, the Granary Weevil is from an eighth to a sixth of an inch in length, of a dark shiny mahogany brown colour, with the head prolonged into a slender snout. Some specimens are almost wholly black. Having no wings beneath the hard wing-cases, it is unable to fly. The eggs are laid in minute holes, which the female beetles bore into the grain with

their slender beaks. On hatching from the egg the young grub at once begins to feed on the contents of the kernel, completes its growth and turns to a beetle inside the same grain, which does not show any sign of injury until the beetle emerges, when it is found that the greater part of the inside has been consumed. In wheat and other small cereals a single larva inhabits a grain, but a kernel of corn furnishes food for several individuals. The mature beetles also feed upon the grain, and live for a long time, so that in warm places where grain is kept in store for a length of time, the injury may be considerable. In the course of a single year it has been estimated that one pair of these weevils will produce 6,000 descendants, so it can be readily seen that they are capable in a short time of doing much damage.

The Rice Weevil (*Calandra oryzæ*, L.).

This insect differs somewhat in size and general appearance from the Granary Weevil. Unlike that species, it possesses fully-developed wings, has two yellowish blotches on each wing-case, is slightly smaller and of a pale brown colour. The life-history of this insect is similar to that of the preceding species, except that in very warm climates the beetles are often found in fields away from any granary, and in the extreme South and in the Tropics the females lay their eggs in standing grain. The Rice Weevil is often found injuring stored grain in company with the Granary Weevil.

The Angoumois Grain Moth (*Sitotroga cerealella*, Ol.).

In Canada the Grain Moth has never developed sufficiently to be considered an important enemy of stored grain. In Southern climates, however, where it is very abundant, this insect is a bad pest. The moths fly from the granaries to the field and lay their eggs upon standing grain. The eggs, or young caterpillars are thus carried with the threshed grain into the granary, where they develop and cause great loss. The moths, however, have not so far been recorded as laying their eggs upon standing grain in Canada, and where damage has occurred, it has been to infested grain which had been imported. The eggs are deposited in groups of from 15 to 25, generally upon the under side of the grain or in the crease of the kernel. They are white at first, turning pink before hatching. The young caterpillar is a minute creature, slender, and covered with long hair. When mature it is 2-5 of an inch in length, and of a dirty white colour. As a rule only one larva enters each grain, but when corn is attacked, two or three larvæ may be found in a single kernel. After

completing its growth the caterpillar spins a thin silken cocoon, and within this changes to a brownish pupa; in a few days later the moth emerges. The perfect insect resembles somewhat a clothes moth. The wings expand about half an inch, are of a satiny cream colour and bear a few dark spots on the fore wings, which are narrow, pointed and fringed. The hind wings are darker and have much wider fringes.

Remedies.—When stored grain is found to be infested by one of the above three insects, or, in fact, by any insects which are known to work in dry cereals, it is a simple matter to destroy them. After repeated experiments, it has been found that the use of bisulphide of carbon will kill all the insects without any injury to the grain as to its wholesomeness for food, or as to its germinating quality for seed. Bisulphide of carbon is a colorless liquid with a very objectionable odour, which vaporizes quickly at the ordinary temperature of the atmosphere. A convenient method for treating small quantities of infested grain, is to fill an ordinary coal-oil barrel, which will hold about five bushels of grain, and the quantity of bisulphide to use is one ounce to every hundred pounds of seed. The bisulphide may be poured right on to the grain or placed in a shallow receptacle, but care must be taken to close up the top of the barrel tightly. This is best done with a cap made specially for the purpose, but may also be done with fine sacks laid smoothly on the top, over which boards are laid, with a considerable weight on them to hold the covering down closely. When grain in bins is being fumigated with bisulphide of carbon, these should be made as nearly air-tight as possible. This may be done by pasting sheets of paper over the outside, or by covering them with blankets or canvas. In tight bins the amount of bisulphide to use is a pound to a pound and a half to the ton of grain. Some entomologists claim that one pound of bisulphide to every 100 bushels of grain is sufficient to destroy all insects, even in open bins. Infested grain should be subjected to the fumes of bisulphide of carbon for at least 48 hours, but as the vapour is very inflammable, no light of any kind must be brought near and no smoking must be allowed near the building when this chemical is being used.

In Queensland it has been found that salt (1 quart dissolved in 2 gallons of water) will prevent weevils from attacking grain which has been sprinkled with this solution.

SOME NEW OR LITTLE-KNOWN BEES.—V.

BY CHARLES ROBERTSON, CARLINVILLE, ILLINOIS.

Prosopis eulophi, sp. nov.—♀.—Front coxæ simple; eyes long; cheeks narrow; metathorax with a distinct enclosure bordered by a raised line; dorsal segment 1 minutely punctured, without lateral white pubescent fasciæ; black; flagellum testaceous beneath; pale yellow marks as follows: lateral face marks about equally narrowed above and below, two lines on collar, tubercles, dot on tegulæ, bases of tibiæ, and base of hind metatarsus; wings hyaline; length 5 mm.

♂.—Resembles the female, but the flagellum is more testaceous and the abdomen, especially dorsal segment 1, more distinctly punctured; face narrowed nearly one-half below; scape broad; face below antennæ whitish, on the eye margin pointed as high as middle of scape; yellowish marks as follows: anterior tibiæ in front, middle and hind tibiæ at base and apex, tarsi, two lines on collar, tubercles, dot on tegulæ; length, 4–5 mm.

Carlinville, Illinois; 10 ♀, 9 ♂ specimens.

Trypetes productus, sp. nov. *Trypetes barbatus*, Trans. Am. Ent. Soc. *29:* 171, 1903, ♂.

This does not belong to the female described under the name of *T. barbatus*. It can be distinguished from the male of *T. carinatus* by the ventral segment 1 being produced to a point; shorter antennæ, with joint 3 more than one-half as long as 4; flagellum darker; clypeus more strongly bearded.

Carlinville, Illinois; 10 ♂ specimens.

Osmia collinsiæ, sp. nov. *Osmia major*, Ent. News, *13:* 79, 1902, ♂.

Evidently this insect, described from one specimen, is not the male of *O. major*. It is likely to be mistaken for the male of *O. atriventris*. It runs a little larger; ventral segment 2 more finely punctured, its apical margin rather densely pubescent; hind metatarsi unarmed; length 8–10 mm.

Carlinville, Illinois; 10 ♂ specimens.

Andrena salictaria, sp. nov.—♀. In size, structure, colour and habits this specimen closely resembles *A. Illinoensis*. It is a little more slender; scutel minutely roughened and opaque; scutel and disc of mesonotum usually more purplish; fasciæ on segments 2–4 more whitish,

thinner, more interrupted on 2; basal process of labrum shorter, more rounded; second submarginal cell usually relatively shorter compared with third.

♂. Differs from the male of *A. Illinoensis* by the scutel being finely rugose and opaque, often without purplish; apex of abdomen rather pointed and with a small tuft; ventral segment 6 not reflexed; hind tibiæ and tarsi more frequently yellowish.

Carlinville, Illinois; 39 ♀, 47 ♂ specimens. *A. Illinoensis* has the scutel smooth and shining. The ♀ type specimen has the fasciæ on segments 2–4 quite thin and white, but fresher specimens have the fasciæ more dense, more ochraceous and hardly interrupted on 2. The male of *A. Illinoensis* has the sixth ventral segment reflexed and bordered with dense pubescence, so that the apex of the abdomen appears to be open, the orifice densely pubescent, the apex thus bearing a great tuft.

Andrena nigræ, sp. nov. *Andrena Illinoensis* form *bicolor*, Tr. A. S. St. Louis *8*: 46, 1898.

This is more nearly related to *A. salictaria* than to *A. Illinoensis*. Peculiarities in its time of flight and flower visits seem to make it desirable to separate it as a distinct species. The name refers to *Salix nigra*, the only flower on which I have found it collecting pollen. *A. Illinoensis* and *salictaria* are likewise oligotropic visitors of Salix.

A NEW ROACH FROM PORTO RICO.

BY A. N. CAUDELL, WASHINGTON, D. C.

Ischnoptera adusta, n. sp.—Description—Male: Colour dark yellowish, with eyes black and the disc of the pronotum slightly mottled with fuscous and the tips of the elytra and wings fuliginous. Anterior femora beneath on the inner margin armed on the apical two-thirds with about ten semiequal, equidistant spines, the basal third unarmed. Subgenital plate roundly incised apically; apical styles long, slender rigid spines extending about half their length beyond the apex of the subgenital plate; cerci long, fusiform.

Length, pronotum, 3.5; elytra, 15; width pronotum, 4 mm. Type number 8400, United States National Museum.

One male, Arroyo, Porto Rico, at light, Feb., 1899; Aug. Busck, coll.

The infuscated apices of the elytra and wings of this Roach will serve to identify it readily, and the armature of the fore femora and the rigid anal styles are different from most American species.

OBSERVATIONS ON LAMPYRIDÆ.

BY FREDERICK KNAB, URBANA, ILL.

Two species of fire-flies are abundant in western Massachusetts in the early summer and often their display of light presents a magnificent spectacle. These species are *Photinus scintillans*, Say, and *Photuris Pennsylvanica*, De Geer. *Photinus scintillans* becomes active very early in the evening, and long before twilight begins its orange-coloured light may be seen flashing among the shrubbery. It is only active during the twilight hour and some time before total darkness has set in its lights have disappeared. This species frequents localities with abundant shrubbery, and often congregates in certain copses or on the margin of the woods, while other similar situations are almost deserted. Even in larger towns, where there are gardens with shrubbery, it may often be seen in some numbers.

The other species, *Photuris Pennsylvanica*, is the most abundant of all the fire-flies. It makes its appearance in the late twilight and its display of light continues far into the night. Its light is more brilliant than that of the first mentioned species and of a distinctly greenish colour. This species is partial to low, moist situations, and is particularly abundant on low meadows bordering rivers. In the time of their greatest activity, when thousands are sending forth intermittent flashes, they offer a spectacle beautiful beyond description.

It occurred to the writer that the difference in the colour of light of these two species of fire-flies might possibly be one of optical effect, rather than an actual difference. While the light of *Photinus scintillans* appeared bright orange and that of *Photuris Pennsylvanica* a pronounced green, no comparison could be made, for the two forms do not display their light at the same time and place. Perhaps the light of *Photinus scintillans* appeared orange simply in contrast with the bright green of the vegetation, still plainly visible at the time of the beetle's appearance, and, indeed, then of a more pronounced colour than under the strong light of full day. This supposition was strengthened by the fact that when one of these insects was brought into the yellow light of a kerosene lamp, its own light, by contrast, appeared of the characteristic phosphorescent greenish colour. One evening specimens of both species were secured and, in complete darkness, were with some difficulty induced to emit their light simultaneously. It was then seen that the light of the two species is very much alike and of a greenish colour, that of *Photuris Pennsylvanica* being of a slightly stronger green.

July, 1905.

I cannot leave this subject without some mention of that interesting form, *Phengodes*. A few years ago the writer found a larva of *Phengodes plumosa* under a stone near Mount Tom, Massachusetts. It emitted light of a brilliant blue colour at the sides of the body segments. Apparently both the larva and the larviform female of some of the tropical species of *Phengodes* and related genera emit light of two colours, as has been reported by a considerable number of observers. In these forms the head, or the region immediately behind it, glows in a brilliant red light, while points along the body segments shine in a white, yellow, green or blue light. Some of these forms are certainly the larviform females, but it seems that the larva also emits exactly the same kinds of light. The reader will find a most interesting account of these luminous forms, accompanied by many bibliographical references, in a paper by Dr. Erich Haase in Deutsche Entomol. Zeitschrift, vol. 32, p. 145–167. The forms found in North America appear to be rare, or at least very local, and our knowledge of them is still very incomplete. It is to be hoped that observers will take every opportunity to make observations on these remarkable forms. Gondot (Revue Zool., 1843, p. 17) states that the male *Phengodes* also is brilliantly luminous, and Haase asserts that the male of his *Phengodes hieronymi* emits a greenish light from the under side of the abdomen. The only male of *Phengodes plumosa* which the writer has seen alive certainly gave forth no trace of light, though this does not prove that it may not be luminous at certain times. This specimen was captured at twilight, near Holyoke, Mass., as it flew rapidly across a road through the woods. The date of capture, May 30th, is at variance with the observation of Thomas Say, published in the Boston Journal of Natural History, vol. 1, p. 157. Under *Phengodes plumosa* he there remarks: "Not uncommon for a short period in the autumn. Attracted by the candle, they enter the house in the evening and fly repeatedly against the ceiling in their efforts to escape."

THE GENUS *VENUSIA* AND ITS INCLUDED SPECIES.*

BY GEORGE W. TAYLOR, WELLINGTON, B. C.

Probably everyone will agree with Dr. Pearsall's remarks in the April number of this journal as to the necessity for a revision of the North American Geometridæ. The whole group is in a sad state of disorder; the old species are not all well understood and many of the newer ones

*See Pearsall, CANADIAN ENTOMOLOGIST, XXXVII, 125, April, 1905.

(Dr. Hulst's and Dr. Strecker's), being unfigured and insufficiently described, are very difficult to identify. It will be some time yet, I fear, before anyone will be in a position to attempt a complete monograph, and probably it will be better to take up the work genus by genus, as Dr. Pearsall is doing.

With regard to the new genus *Nomenia*, I have carefully examined all the specimens in my collection from California, Nevada and British Columbia, which, according to the nomenclature of Dr. Dyar's Catalogue, would stand under the name *Venusia duodecimlineata*, Packard, but I cannot find among them any that possess the antennal structure described by Dr. Pearsall.

This does not, of course, prove that the genus *Nomenia* is not a good one, but it shows that *not all* the California so-called *12-lineata* belong to it, and so until Dr. Packard's original types (from California) can be examined it will be doubtful whether the name *12-lineata* should be attached to the *Nomenia* or to the ordinary form. The genus *Venusia* as Dr. Pearsall points out, is represented in North America by a single species, *V. cambrica*, Curtis. The other species listed by Hulst under *Venusia*, form with *Euchœca lucata*, Guenée, a distinct and natural group. But I am afraid we have not yet got these quite correctly named in our lists.

My good friend Mr. L. B. Prout, of London, is very carefully going over, on my behalf, Walker's type specimens in the British Museum; and he tells me that the type of *Tephrosia ? comptaria*, Walker, (from Nova Scotia), is certainly not a specimen of *L. perlineata*, Packard, as Hulst supposed, but a *12-lineata*, Packard—eastern form.

I think, therefore, that the name *Euchœca comptaria*, Walker, must be used for the eastern, British Columbia and the bulk of the California specimens of *12-lineata*, Packard. The species now called *Comptaria* will retake its former name *E. perlineata*, Packard, and *Euchœca lucata*, Guenée, with *condensata*, Walker, as a synonym, will complete the group.

I would therefore list the species referred to as follows:

Venusia cambrica, Curtis.
Nomenia 12-lineata ?, Packard.
Euchœca comptaria, Walker.
= 12-lineata, Packard (part).
= salienta, Pearsall.
Euchœca perlineata, Packard.
Euchœca lucata. Guenée.
= condensata, Walker.

I may add that the type of *inclinataria*, Walker, (= inclinata Hulst), placed by Hulst in the synonymy of *comptaria*, is a specimen of *Xanthorhoe ferrugata*.

PRELIMINARY LIST OF THE MACRO-LEPIDOPTERA OF ALBERTA, N.-W. T.

BY F. H. WOLLEY DOD, MILLARVILLE, ALTA., N.-W. T.

(Continued from page 230.)

373. *Cosmia discolor*, Walk.—(*paleacea*, Esp., of North American authors, in error.) Common in 1903, ♂ ♂ Aug. 31st to Sept. 23rd; ♀, only one observed, Sept. 7th. A single specimen only (♂) taken previously, in 1895. A few during 1904. Treacle.

374. *C. punctirena*, Smith (? =*infumata*, Grt.).—Common in 1903, in about double the numbers of *discolor;* ♂ ♂ Aug. 8th to 22nd; ♀ ♀, common, Aug. 7th to Sept. 5th. A few specimens in 1899 and 1904. Treacle.

[Note.—*C. paleacea*, Esp., has probably never been taken in N. America.]

The above synonymy is merely tentative, as I dare not risk any definite reference without a personal inspection of types. I only purpose for the present to try and make clear my reasons for claiming that we have two North American species which have long been confused with, but are distinct from, the European *paleacea* of Esper. The dates given above are for 1903 only. The earliest dates represent absolute first appearances, and the latest are fairly indicative of the duration of each.

Of *discolor* I have under examination 32 ♂ ♂ and 7 ♀ ♀, of which 2 ♂ ♂ are from Kaslo, B. C., 3 ♂, 4 ♀ from Cartwright, Man., 3 ♂, 1 ♀ from Aweme, Man., and a specimen without abdomen, but apparently a ♀, from Franconia, N. H. The balance are Calgary specimens. Expanse of males, one 38 mm., the rest 40 to 45 mm. Females 44 to 47 mm. Colour from a pale straw-yellow to rosy, orange or ferrugineous, with generally more or less of a smoky suffusion, but this is never quite uniform and does not tend to obscure the maculation. The t. a. line forms an obtuse, though *generally distinctly pointed* angle in submedian interspace. It is often scarcely larger than a right angle. The discoidal spots are distinctly, often quite contrastingly, paler than ground colour, the orbicular immaculate, the reniform occasionally so, but often with a smoky shading on its lower border, where the central transverse shade of the wing touches the junction of veins 4 and 5 with the cross-vein at the end of the cell. This shading may sometimes be traced throughout the length of the reniform on the cross-vein, but *very rarely tends to form a dark spot* on its lower edge as it does in *punctirena* and *paleacea*. The secondaries are very pale

immaculate yellow on the costal region, but have either a smoky or a distinctly pink or rosy shading from the base nearly to the hind margin over the central and lower portion. This shade is often darkest on the veins, and forms a stronger *contrast with the costal region* than is seen in *punctirena*. The ♀ abdomen is more thinly scaled than is the case with *punctirena*, is *longer, and tapers narrowly to a point* from which the ovipositor generally protrudes. The type is in the British Museum, and is, Sir George Hampson tells me, "a yellow form, partly suffused with fuscous."

Punctirena was described from Colorado, Wyoming, and Cartwright, Man., and a poor figure accompanies the description. The type is a Cartwright specimen, and is in the U. S. National Museum. I have a ♀ from Ottawa, and a very imperfect specimen, but one of which the identity is beyond question, taken on the summit of Mt. Washington, N. H. In all I have at present under examination 23 ♂ ♂ and 34 ♀ ♀, and all but the two above mentioned are Calgary specimens. Expanse of males, one 34 mm., another 44 mm., the rest from 39 to 43 mm. Females 41–45 mm. A description of the colour would sound exactly like that of *discolor*, but whilst the variation in shades of yellow or reddish covers the variation for that species, *discolor* is decidedly the brighter coloured species of the two, but the extreme range of variation in *punctirena* is greater. The colour difference, though individuals can be occasionally matched, is obvious in a series, but hard to express in words. *Punctirena* has the same smoky or fuscous suffusion, but this has a strong tendency to obscure both the ground colour and the maculation, which is not the case in *discolor*. A few specimens appear to be of a uniform smoky-brown ground, with a faint reddish or orange tinge, and as a whole *punctirena* runs very much the darker of the two, and none of my specimens can be called rosy. The t. a. line forms an obtuse, but *more or less rounded* angle in the submedian interspace. The angle may be pointed, but is generally a larger angle than that formed by the same line in *discolor*. The discoidal spots are more often nearly concolorous, rarely contrasting with ground colour, and there is always *a very distinct dark spot* on the lower edge of the reniform. This spot is evident even when the rest of the maculation is obscured. The secondaries are duller than in *discolor*, and though they generally have a smoky suffusion throughout their lower portion, the rosy shade never seems to be present, the veins are not distinctly darker, and costal area, though generally paler, *does not contrast*. The ♀ abdo-

men is hardly more thinly scaled than the ♂, except that the lateral and terminal tufts are absent, is *shorter than in discolor*, *does not taper so sharply*, and the ovipositor less often protrudes.

In the above descriptions I have only mentioned those characters which I have found to be of value in separating the two species, and have italicized those points which I believe to be of the most importance. As is so frequently the case with closely allied species, it does not seem possible to find any one distinctive character which is quite constant, and though a long series of each at once conveys the impression of distinctness, a few individuals are, I admit, rather hard to place, and differentiation must be sought in a sum total of all the characters. A recapitulation of the points of difference may be useful.

(1) *Discolor* is the brighter coloured of the two, has more of a rosy and less of an orange tendency, and does not run to such dark smoky-brown forms.

(2) The t. a. line in *discolor* is usually not only more sharply angulated, but the angle tends to be pointed rather than blunt or rounded, as it generally is in *punctirena*. Though this difference is perhaps the most obvious of any in a series, it is not constant. It is, however, much easier to find *punctirena* in which the angle is sharp or pointed than to find *discolor* in which it is blunt or rounded.

(3) The discoidal spots are generally more contrastingly pale in *discolor* than in *punctirena*, and though in the latter species they are sometimes contrastingly pale, a concolorous tendency is much more frequent than in *discolor*.

(4) A dark spot in lower portion of reniform in *discolor* is rarely developed to any marked degree, but in *punctirena* it is generally prominent, and often the most conspicuous mark on the wing. This is quite characteristic of the two species as a whole, though as a matter of fact I have *discolor* with a more distinct dot than some of my *punctirena*, which all but lose it.

(5) The secondaries in *discolor* have usually more of a dusky, often rosy shading in their posterior portion, which is sometimes darkest on the veins, and the pale costa contrasts rather strongly. *Punctirena* has dusky, but not rosy, secondaries, with slightly paler, but not contrasting, costa. Either species may sometimes have secondaries almost immaculate, but as a rule they are darkest in *discolor*, except on the costa. This is another conspicuous feature in a series.

(6) In the ♀ ♀ the abdomen of *discolor* is more thinly scaled than in *punctirena*, is longer, more narrowly tapering, and the ovipositor more often protrudes.

(7) *Discolor* is, at Calgary, slightly the larger species of the two, and during 1903, when both were fairly common, was *quite three weeks later* in appearance, and continued turning up at treacle after *punctirena* was over. This last is certainly not amongst my least important points.

Of European *paleacea*, Esp., (*Euperia fulvago*, Hbn.), I have 7 ♂ ♂ and 3 ♀ ♀ from the British Isles, chiefly from Sherwood Forest, Notts, and 6 ♂ ♂ and 21 ♀ ♀ bearing labels of numerous other European and some Asiatic localities. If it were not that I feel so confident of the distinctness of *discolor* and *punctirena* in this one locality, I might easily have been deceived into looking upon both as local races or mere varieties of *paleacea*, which combines some of the characters of both. But it combines them in such a way as to bespeak a third species. It comes between them, but without connecting them. In colour it is brighter than either, but in the 37 specimens before me there is much less colour variation even than in *discolor*, and scarcely any tendency to a smoky suffusion. A few specimens of all three can be found to match in colour almost exactly. It varies from a very pale golden-yellow, through straw, to orange. The latter form is, I believe, the var. *angulago* of Haworth, and the var. A. of Guenée. The former, though mentioned in Tutt's "British Noctuæ and Their Varieties," Vol. III, p. 19, is entirely omitted from the Staudinger Catalogue, in which, however, an aberration *Teichi* is listed and referred to as a form shaded with fuscous. Colour, however, is not usually of important specific value in forms in widely separate localities. The t. a. line has generally the sharp angulation of *discolor*, which is conspicuous in a series, though a few specimens have it decidedly blunt. The discoidals have a stronger tendency to be concolorous than even in *punctirena*, and the dark spot in the reniform is strongly developed in all my specimens but one, in which the entire maculation is so faint that the spot, though discernible, has almost become obsolete. The secondaries are frequently immaculate, but have sometimes a slight dusky or even pinkish shading in their lower portion. The ♀ abdomen, though scaled as in *punctirena*, is long as in *discolor*, but not quite so sharply tapering. The ovipositor sometimes protrudes. So that *paleacea*, whilst in colour of both primaries and secondaries it cannot be called either intermediate, or nearer to one than to the other, has usually the sharply angulated t. a. line of *discolor*, the discoidal spots of *punctirena*, and a ♀ abdomen somewhat intermediate

between the two, but decidedly tending towards *discolor*. A combination of *discolor* and *punctirena* would make *paleacea* in everything except colour, and the supposed distinctness of the latter from each is based solely upon my confidence in the distinctness of the two former from each other. Dr. Dyar, in his Kootenai list, refers those specimens from Kaslo having the dark spot in the reniform to *paleacea*, those lacking it to "var. *discolor*, Walk." As before pointed out, my use of the names *discolor* and *infumata* are merely tentative. Sir George Hampson tells me that *infumata* is "a gray-brown form," and though he not long ago expressed his opinion to me that *punctirena* was a synonym of *infumata* and *discolor* probably distinct, he has since told me that he considers all four names to refer to one species. Of the published figures of the three species which I have had the opportunity of examining, that in Newman's "British Moths" has not as well developed a dark spot in reniform as *paleacea* usually seems to possess, nor as sharply angulated a t. a. line. I have, however, specimens with a blunter angle, but not with such a constricted, though really a fainter dark spot. As there is no colour guide, it would be quite excusable to say that the figure combined all the characters of *punctirena*. But constriction of the spot is a variation which in all probability occurs in the European species, as it certainly does in *punctirena*, which in that point then approximates an occasional partially developed spot in *discolor*. In Barrett's "Lepidoptera of the British Islands," Vol. V, pl. 223, figs. 2 and 2a, though the dark spots are well developed, the t. a. lines again, in both figures, have a blunter angle than seems usual. But the even, unicolorous appearance of both primaries and secondaries at once bespeaks *paleacea*. The merest glance at Dr. Holland's pl. xxvi, fig. 32, gives the immediate impression of European *paleacea*, exactly, and in every detail. The uniform, slightly orange-yellow primaries, sharply angulated t. a. line, concolorous discoidals, except for the typically well developed dark dot, and the clear immaculate secondaries, combine to make such an excellent representation of the Old World species, that I will be bold enough to assert that it actually does represent *paleacea*, Esp., and is therefore correctly named. But I have so far not seen the species from North America, and I seriously doubt its being a North American specimen. I asked Dr. Dyar his opinion of the figure, and he replied: "I cannot match Holland's figure in my American specimens, though I have about a hundred of them. I have but two European specimens, yet one of them is the exact match of the figure." The figure of the type of *punctirena* in CAN. ENT. XXXII,

pl. 5, is evidently from a very poor negative and therefore of little value. But the rounded bend of the t. a. line (just traceable), the well-developed spot, and the general smoky-suffused appearance, leave me in no doubt about my having the species correctly named. In addition to which I have specimens named by Prof. Smith himself. I have not been able to procure *venosa* for comparison, and the very small number I have succeeded in obtaining from correspondents, though I have been trying for eighteen months,causes me to suppose that neither *discolor* nor *punctirena* are by any means generally common, though they seem to have the same range. I much regret that I have had finally to write this article with so little outside material for study.

375. *Orthosia verberata*, Smith., (CAN. ENT. XXXVI, 153, June, 1904).—Described from two pairs from here. Of these, the type is at Rutger's College, and a pair are co-types in my own collection. Only ten or a dozen specimens have been taken altogether; one in 1904, the rest during 1903. Sept. 11th to 27th; treacle. Under the description the form is stated to be allied to *ferruginoides*, but no comparison is made. Of *bicolorago* and its var. *ferruginoides*, I have a good series from the Eastern States, and two ♂ ♂ and a ♀ from Cartwright, Man., where I understand from Mr. Heath it is not uncommon. The more usual form is of an orange or rusty, that is a ferruginous, yellow, varying in tint in different specimens, with basal, t. a., and t. p. lines, central shade, and subterminal area purplish, though in the palest specimens the purple shadings are very slight. This, Dr. Dyar tells me, is the so-called variety *ferruginoides*. Typical *bicolorago* is a less common form, with a purplish shading over the entire outer portion of the wings, both primaries and secondaries, beyond the central shade, making an obvious colour contrast with the inner portion, which probably suggested its name. I have at least one specimen intermediate between the two forms. Of the three Cartwright specimens, the two ♂ ♂ are var. *ferruginoides* and the ♀ *bicolorago*, and their place is obviously with the eastern form. *Verberata* is luteous or buff rather than yellow, though a few specimens have a more decided ferruginous tint than any of my *ferruginoides*, and whilst purplish transverse lines and shadings seem always present, I have as yet seen no approach to the *bicolorago* form in the Calgary species. The secondaries are uniformly dark smoky below the subcostal vein, but the costa is pale and contrasts strongly, which is rarely the case with my *bicolorago*, in which the secondaries are, as a rule, much paler. The t. a. line seems

better defined and less coarse than in the older species, the t. p. line less obviously crenulate, and the discoidal spots more clearly outlined and slightly larger. The two series contrast somewhat, and, were they mixed, I feel sure I should not have the least difficulty in picking out every Calgary specimen without the aid of labels. I am inclined to look upon *verberata* as a good species. It resembles the late C. G. Barrett's figures of British *ferruginea* much more than do any of my Manitoba or eastern specimens. I hope soon to have an opportunity of comparing all three forms together. Dr. Dyar, in the Kootenai list, records *bicolorago*, var. *ferruginoides*, from Kaslo. I sent him a Calgary specimen of *verberata*, and whilst questioning its validity as a species, he added, "The Kaslo specimens should be *verberata* if this name holds."

376. *O. euroa*, G. & R.—Not common in 1896, and a few taken in 1897, at treacle. Not met with since. Middle to end of August.

377. *O. Conradi*, Grt.—Fairly common. July and Aug. An extremely variable species, of which I have closely studied a long series. It varies from a very pale luteous to a dark crimson. Some specimens are almost immaculate except for the dark spot in reniform, others have the transverse lines very distinct.

378. *Parastichtis discivaria*, Walk.—Common some years. July and Aug. Treacle. Sir George Hampson has specimens from me. He called what I sent him *gentilis*, Grt., adding, "*Discivaria*, Walk. = *perbellis*, Grt., is, I think, a distinct species." It varies enormously, but I cannot make more than one species out of Calgary material.

379. *Scopelosoma tristigmata*, Grt. Rare.
380. *S. devia*, Grt. Common.
} Sept., Oct. and April and early May, at treacle and sallow blossoms.

381. *Homoglæa hircina*, Morr.—Generally very rare, but rather common in 1898 and again in 1904. End April and early May. Sallows and treacle. A very variable species.

382. *H. carbonaria*, Harr.—Rare. Oct. and early May.

383. *Ipimorpha pleonectusa*, Grt.—Far from common, but fairly regular in appearence. Middle July and Aug.

384. *Dasyspoudæa Meadii*, Grt.—Two specimens at light. July 23rd, 1901.

385. *Copablepharon absidum*, Harr.—Two fine specimens at the Calgary town lights, on Aug. 7th, 1902, by Mr. T. N. Willing, through whose kindness one of them is in my collection. The name is on the authority of Dr. Fletcher.

386. *Heliothis phlogophagus*, Grt.—Rare. End May and June. Flying in sunshine.

387. *Schinia cumatilis*, Grt.—Three specimens. July 21st to Aug. 2nd, 1900 and 1903. Light.

388. *Melanoporphyria Oregona*, Hy. Edw.—Not common. Middle June to middle July. A day-flyer.

389. *Melicleptria septentrionalis*, Hy. Edw.—Rather more common than the preceding. Middle May to middle July. Also a day-flyer. Sir George Hampson treats this as a synonym of European *ononis*, Fabr. Superficially this and the preceding species are rather alike, and might easily be confused by one who was not acquainted with the range of variation. Among the several points of difference which I have found constant, perhaps the most obvious is that the reniform in *septentrionalis* is outlined posteriorly by a broad black line, never present in *Oregona*.

390. *Heliaca diminutiva*, Grt.—One specimen, flying in sunshine, June 9th; 1897.

391. *Polychrysia trabea*, Smith.—Described from here, and figured with description. The type is at Washington. Decidedly rare, but fairly regular in appearance. Middle July to middle Aug. Light. This species is referred by some, including Dr. Dyar, to Oberthür's var. *esmeralda* of *moneta*, Fabr. So far I have seen nothing written on the subject whatever, beyond Dr. Dyar's listing, and a few vague suggestions in private letters. *Moneta* appears to be common in some parts of Europe, and is also stated to occur in Siberia, and the mountain districts of Central Asia. It was not taken in the British Isles previous to 1890, but has since been of fairly regular occurrence in some of the south-eastern counties of England, though very far from common. The var. *esmeralda* seems to differ from the typical form in being of a yellowish-white colour instead of golden-yellow, and Mons. Oberthür says in the description: "It has exactly the same markings (as typical *moneta*) except so far as concerns the bent extrabasal line below the median nervure of the superior wing. This line is double in *moneta*, simple in *esmeralda*." The var. is stated to be not uncommon in Amurland (Siberia). I have two British specimens of *moneta* in my collection, through the kindness of Mr. L. B. Prout, of London, Eng. They differ from Alberta specimens in being decidedly richer in colour, and have the maculation better defined. The inner portion of the t. a. line, evident in the British specimens, has a tendency to become obsolete in the Calgary form. The secondaries in the latter are

also a little paler. I can see nothing to separate them as species, but a comparison of five North American specimens with two European is hardly a fair basis from which to arrive at any definite conclusion, and I therefore follow Prof. Smith. In Europe *moneta* is partially double brooded, and the larva feeds on *Aconitum napellus* (Monkshood), *A. lycoctonum*, various species of *Delphinium* (Larkspur), and *Trollius Europæus* (Globe flower). My information concerning the European species is all derived from Barrett's "Lepidoptera of the British Islands," Vol. VI, p. 102–107, and Tutt's "British Noctuæ and their Varieties," Vol. IV, p. 20–23. The new-world form is figured as *moneta* in Dr. Holland's book, and the figure is an excellent one. It is there stated to occur in Assiniboia as well as Alberta, but so far as I know it has not yet been turned up elsewhere. The type is at Washington, and is figured in Ent. News, Vol. VI, pl. xv, December, 1895, and described in Vol. VII, No. 1, of that magazine. Its sex is not stated. Sir George Hampson accepted the species as *trabea* without comment.

392. *P. purpurigera*, Walk.—Very rare. Light and at dusk. Aug.

393. *Plusia æroides*, Grt.—Not common. Middle July and Aug. Light.

394. *Euchalcia venusta*, Walk.—Rare. Middle July to middle Aug. Light.

395. *E. Putnami*, Grt.—Fairly common. July and Aug. Light. The species is referred by Dr. Dyar as a var. of European *festucæ*, Linn., a fairly common European species. I have four British *festucæ*, which differ from Calgary specimens chiefly in being darker and having larger metallic spots, and a golden metallic spot at base of primaries, not present in any of a large number of *Putnami* I have examined. In my *Putnami* the two central spots are often joined, which I believe is seldom, if ever, the case with *festucæ*. I find it stated by Mr. Tutt that Guenée claimed to have seen a North American specimen exactly like the European species. Dr. Ottolengui, in his paper on Plusia (Journ. N. Y. Ent. Soc. X, p. 57–82 and pls.), suggests the possible existence of two or even three species known as *Putnami* on this continent. The north-west form is certainly less like *festucæ* than *trabea* is like *moneta*.

396. *Autographa mappa*, G. & R.—Two specimens, July 24th, 1898, and July 22, 1903. Probably at light.

397. *A. bimaculata*, Steph.—Fairly common. Middle July and early Aug. Dr. Ottolengui believes the north-west form to be either a

geographical race or else a new species. I have no material from other localities.

398. *A. Californica*, Speyer—Common. I have records from May to September. I believe it hybernates here, and is almost certainly a migrant. *Ou* seems to be a closely allied species of which I have two specimens from Louisiana, Mo., sent me as such by Mr. Henry Engel. I see differences, but as they are not very strongly marked I dare not risk a comparison without more material. Dr. Ottolengui in his notes on "Plusia and Allied Genera" (Journ. N. Y. Ent. Soc. X, 57-82, June, 1902), states that the two are quite distinct.

399. *A. pseudogamma*, Grt.—Not common. Middle July and early Aug. There seems to have been a good deal of confusion in the past between this and the preceding species. I had both named for me by Prof. Smith some years ago, and his determinations were corroborated by Dr. Ottolengui at the time he wrote his paper. The differences between my two series are also in accordance with Dr. Ottolengui's figures, which, however, are unfortunately not clear enough in detail to bring those differences out plainly. Of the two, *Californica* has the most acute apices. It has far less of the greenish or bronze lustre seen in *pseudogamma*, and is much more reticulated in appearance, chiefly owing to the transverse lines being more clearly marked and more irregular, though actually finer. One of the most constant points of difference is seen in the outer margin of primaries. In *Californica* the lunulate dark terminal line is duplicated by another at the base of the fringes, and preceded by a third, finer and more direct one, in the terminal space. It has thus the appearance of being treble. In *pseudogamma* the terminal line is obviously single and less lunulate, and though bordered anteriorly by a narrow shade of the pale ground colour, is not preceded at a short distance from it by a fine and separate line as in *Californica*. Dr. Holland's figure standing as *pseudogamma* is not sufficiently clear to bring out points of difference with any exactness, but from the distinctive characters in the terminal area which I have just pointed out, there can be little doubt that the specimen figured is really *Californica*. *Precationis* is a species which, until I obtained and compared a good series, I had considerable difficulty in separating from *pseudogamma*. There is a difference in the sign, I admit, the upper portion being more open in *pseudogamma*, but unless I have more than one species under *precationis*, the sign seems a much more variable character in this than in most of its allies. It is really a brighter coloured species, with more of a bronze or coppery lustre, and has finer transverse lines.

400. *A. flagellum*, Walk.—Redescribed from here by Prof. Smith as *insolita*, of which the type is at Washington. It is figured in Ent. News, VI, Pl. XV. Not common, but regular in appearance. Middle July and Aug.

401. *A. rubidus*, Ottol.—Four ♀ ♀ only. Two are in my collection. One is dated July 2nd, 1901, and was the first I ever saw. It has been seen by Dr. Ottolengui, and is a good specimen. The other, dated June 26th, 1903, is badly rubbed. A ♀ from here is in the U. S. National Museum, and another is in the British Museum. At first sight it might be taken for an aberrant *pecationis* or *pseudogamma*, but amongst other differences it is easily distinct from both by the sign, which runs to a rather sharp point posteriorly. It was described from Cartwright, Man., and St. John, N. B., and a good figure is given with the description. The type is a ♀ in Dr. Ottolengui's collection.

402. *A. alias*, Ottol.—I have a ♂ from Blackfalds, Alta., about a hundred miles north of Calgary, taken by Mr. Gregson on July 28th, 1902, which bears Dr. Ottolengui's label, and has been seen by Sir George Hampson. The species is stated by its author to be common throughout Canada and the Northern States, and to have been confused with *u-aureum*, whilst resembling *rectangula*. *U-aureum* is now dropped from our lists as not North American. The type is a ♂ in Dr. Ottolengui's collection. I have two Pine Creek specimens dated Aug. 9th and 16th, which I should say are undoubtedly the same species, and a fourth from St. John, N. B, which was sent me a few years ago as *mortuorum*. All agree with the two figures of *alias* given in Dr. Ottolengui's paper. One Didsbury (Alta.) and two Pine Creek specimens show some slight modifications in the sign, but after much study I have not been able to satisfy myself that they differ specifically. I sent one of these to Sir George as possibly *excelsa*, and he returned it labelled *octoscripta*. It is certainly not unlike Dr. Ottolengui's figure of that species, which, however, is not clear in detail. It bears date Aug. 21st, 1903, and the others are dated Aug. 7th and 9th, 1903–4.

403. *A. excelsa*, Ottol.—I have the name only, but Dr. Ottolengui tells me that he has at least three specimens from me. One of these is a ♂, taken at light on Aug. 29th, 1895, and was named *angulidens* for me by Prof. Smith some years ago. The two species are stated to be very much alike, but separable amongst other differences by the sign, which in the present species is rather V-shaped, and in *angulidens* more like a U. It has the same range as *alias*, whereas *angulidens* appears to be

exclusively confined to Colorado. I have a badly-rubbed specimen from Field, B. C., which I take to be this species. The type is a ♂ in the collection of Dr. Ottolengui.

404. *A. epigæa*, Grt.—Two ♂ ♂ July 29th, 1898, and Aug. 21st, 1903, and a ♀ July 27th, 1904, the latter marked "dusk," are all I have in the collection. It was only when finally touching up these notes for sending to press that I noticed that I had two species under *ampla*, and after a careful comparison with Dr. Ottolengui's figure, I have little doubt that the three I have picked out are *epigæa*. Once recognized as distinct, their difference is rather obvious. The ground colour is dark silvery ashen gray, without the obvious purplish shading of *ampla*. There are no blackish marks near apex and anal angle as in *ampla*, and the t. p. line is not bordered anteriorly throughout its length by black, and does not meet the inner margin quite so near the anal angle, which in this species is more obviously falcate. One difference in the sign appears to be that in the present species its inner portion touches the median vein on the t. a. line, whereas in *ampla* it touches it at a point slightly further from the base. This holds in my specimens, and is seen even more clearly in Dr. Ottolengui's figures, but the slight variation in my short series of both leads me to doubt its constancy. It is quite probable that I have sent away a few as *ampla*.

405. *A. ampla*, Grt.—Rare. I have only six specimens at present in the collection, bearing dates from July 7th to Aug. 6th. Light.

406. *A. falcifera*, Kirby.—Fairly common. End June to early Sept. Flying in daytime and at light. One specimen quite fresh on May 8th, 1900. Dr. Ottolengui's paper tells us that *falcifera* is the gray form of the species, and "was described from Nova Scotia, and it is noteworthy that in the north the brown form is rare." *Simplex* is the darker, brown form, and "was described from New York, where the brown form is common." The majority of Calgary specimens fall between Dr. Ottolengui's figures of the two forms, and I have nothing quite matching either of those extremes, but some are darker than Dr. Holland's figure, though less red. Though distinctly brown specimens occur, the general tendency is towards gray, at the expense of brown. By far the grayest specimen I ever saw was a Regina specimen of Mr. Willing's, dated June 16th, 1904.

407. *A. diasema*, Bdv.—A single ♀ flying in sunshine on Sulphur Mt., Banff, Aug. 13th, 1900, at a little over 5,000 feet, has been seen by Dr. Ottolengui. (To be continued.)

MANITOBA MICRO-LEPIDOPTERA.

BY W. D. KEARFOTT, MONTCLAIR, N. J.

(Continued from page 208.)

Exentera apriliana, Grote.—Aweme, IV, 30, to V, 21; Beulah. Thirteen specimens. This is a particularly interesting capture. Grote's description* is remarkably brief, and his generic description, occurring on the same page, is misleading on account of an error. He states: "Hind wings 7-veined, 5 wanting." I know of no Tortricid genus in which 5 is absent; frequently 3 and 4 are coincident or stalked for their entire length, but even this is not the case in any one of these specimens; 3 and 4 are stalked from a quarter to a half. Prof C. H. Fernald kindly examined his type specimen, given him by Grote, and advises that in this specimen, which is a female, veins 3 and 4 are stalked for half their length, vein 5 present, bent strongly towards base, and arising close to origin of 3 + 4. It is exceedingly doubtful that Grote's genus will stand. The specimens are dark grayish-fuscous, almost immaculate, but with more or less obsolete-darker, narrower fascia from middle of costa to angle, and the basal area defined by an oblique line rising out of dorsum at inner quarter, but lost above middle of wing. Hind wings pale gray. Expanse 15. to 20. mm. Fore-wings narrow and outer margin rounded, not indented.

Proteopteryx columbia, Kearf.—Aweme, VII, 14. One specimen, agreeing with the type of the darkest form.

Epinotia incarnana, Haw.—Aweme, VII, 31. (Europe and California.)

Epinotia fasciolana, Clem.—Aweme, VI, 6 to 10; Beulah. (Maine to Penna.)

Epinotia liturana, Wlsm.—Cartwright. Type from California, not since recorded.

Epinotia imbridana, Fern.—Rounthwaite, July; Aweme, VI, 9, to VIII, 12. This has been a MS. name for many years. Dr. Fernald promises to have the description in print before this appears.

Epinotia pseudotsugana, Kearf.—Rounthwaite, Aug.

Epinotia lindana, Fern.—Rounthwaite, Aug. (Canada, Mass.)

Ancylis mediofasciana, Clem.—Aweme, VI, 6; Beulah, VIII, 15; Winnipeg. (No. Atlantic States.)

Ancylis nubeculana, Clem.—Rounthwaite, Aug. (No. Atlantic States.)

Ancylis laciniana, Zell.—Rounthwaite, June; Aweme, VI, 16 to 25. (Type from Mass.)

*CAN. ENT., IX, 227, 1877.

Ancylis comptana, Froel.—Aweme, V, 21. Supposed to be the same as the European strawberry leaf-roller and pest.

Ancylis dubiana, Clem.—Rounthwaite, June. (Type from Virginia.)

Ancylis angulifasciana, Zell.—Rounthwaite, Aug.; Aweme, V, 21, to VI, 14. (Maine to Ohio.)

Ancylis plagosana, Clem.—Aweme, V, 21 to 29; Beulah. Described from specimens collected in Labrador, not recorded since; a most interesting new record.

Ancylis diminuatana, Kearf.—Aweme, V, 21; Winnipeg.

Enarmonia prunivora, Walsh.—Aweme, VII, 6. (Missouri to Minnesota.)

Enarmonia lautana, Clem.—Aweme, IV, 29, and V, 1. (Virginia and Texas.)

Enarmonia gallæsaliciana, Riley.—Aweme, VI, 6 and 25; Rounthwaite, June and August. (New York to Texas.)

Enarmonia nigricana, Steph.—Rounthwaite, June. This is the species, the larvæ of which are sometimes quite injurious to cultivated peas, common to Europe, and supposed to have been introduced into America.

Hemimene simulana, Clem.—Aweme, VII, 25. (Atlantic States.)

Acleris nivisellana, Wlsm.—Aweme, IV, 30, to V, 14. (Maine to California.)

Acleris simpliciana, Wlsm.—Aweme, VI, 10, and X, 12. (New Hampshire and Oregon.)

Acleris pulverosana, Walk.—Beulah, May and July. Type from Hudson's Bay, not since recorded.

Acleris hastiana, Linn.?—I have, not only from Manitoba, but from all parts of North America, several hundred specimens, representing the most diverse and bizarre varieties, that may finally find lodgment under this name. I have also a number of European specimens representing a number of varieties. I do not feel able, at this time, to pass judgment on the species, and the only way the question will ever be satisfactorily solved will be by extensive breeding and inbreeding. So far as I know, none of the species of this genus are borers in stems or roots, all leaf tyers and crumplers, hence for any one with the time and opportunity, extensive breeding operations are not difficult. Meyrick gives the European food-plant as "*Salix*" (willow). I have bred several of the so-called varieties from huckleberry.

Epagoge sulfureana, Clem.—Beulah, VII, 15; Rounthwaite, July.

The very pale canary yellow form, with the oblique lines reduced to three or four red dots, hind wings pale fuscous. (Atlantic States.)

Cenopis reticulatana, Clem.—Aweme, VII, 27, to VIII, 12; Cartwright, VIII, 12 to 28; Rounthwaite, July. (Atlantic and Southern States.)

Cenopis Pettitana, Rob.—Cartwright, VII, 22, to VIII, 14. (Atlantic States.)

Sparganothis senecionana, Wlsm.—Cartwright, VIII, 8. (California and Oregon.)

Sparganothis irrorea, Rob.—Rounthwaite, July; Aweme, VII, 9. (Maine to Colorado.)

Sparganathis breviornatana, Clem.—Winnipeg. I have long series, both male and female, of this species, as well as *S. xanthoides*, Walk., and can see no reason for uniting them.

Sparganothis puritana, Rob.—Rounthwaite July. (No. Atlantic States.)

Sparganothis vocaridorsana, Kearf.—Aweme, VII, 10; Winnipeg; Rounthwaite, July.

Archips rosaceana, Harris.—Aweme, 16 males and no females, VII, 1, to VII, 27; Cartwright, both sexes; Rounthwaite, July. (Northern United States.)

Archips purpurana, Clem.—Aweme, VII, 27 to 27. (No. Atlantic States.)

Archips cerasivorana, Fitch.—Cartwright, VIII, 4, to IX, 8. (Northern U. S. and California.)

Archips semiferana, Walk.—Rounthwaite, July. (Atlantic States to Colorado.)

Archips fervidana, Clem.—Criddle, VIII, 3 and 12; Beulah, VII, 15, to VIII, 15. (No. Atlantic States.)

Archips fractivittana, Clem.—Winnipeg. One specimen, paler yellow than eastern examples, the oblique brown band almost obsolete, and represented only by a small dot on costa, a larger blotch at anal angle, and a medium size spot midway between them. (So. Atlantic States and Ohio.)

Archips afflictana, Walk.—Winnipeg, V, 17. (Northern States and California.)

Archips virescana, Clem.—Rounthwaite, July. (Common all over North America.)

Archips glaucana, Wlsm.—Aweme, VII, 22 to 31; Beulah, VII, 15. Described from So. Oregon, not since recorded.

Archips Clemensiana, Fern. Rounthwaite, Aug. (Maine to Wisconsin.)

Archips persicana, Fitch.—Rounthwaite, July; Aweme, VI, 25, to VII, 12; Cartwright, VII, 11. (North Atlantic States and Canada.)

Platynota sentana, Clem.—Rounthwaite, July; Aweme, VII, 2 to 12. (Maine to Texas.)

Pandemis Canadana, Kearf.—Aweme. VIII, 2 to 13; Cartwright, VIII, 5 to 14; West Manitoba.

Tortrix Alleniana, Fern.—Cartwright, VI, 28, to VIII, 4; Aweme, VII, 9 to 23; Rounthwaite, July.

Tortrix lata, Rob.—Aweme, VII, 15, to VIII, 15; Winnipeg; Rounthwaite, June. Since writing the note, which appeared on page 93, *ante*, on *T. pallorana*, Rob., I have had the opportunity of examining specimens of both these species, as identified by Prof. Fernald, and while I am not convinced that there is more than one species, would, for the present, place those from Aweme, as well as those collected by Mr. Willing, under *lata*. The coloration of both are of much the same shades, and individual variation connect the two series, and the only good difference is that the fore wings of *lata* are broader in proportion to their length than *pallorana*; the termen of the latter is more oblique.

Tortrix albicomana, Clem.—Rounthwaite, July, the intermediate yellow form.

Tortrix quercifoliana, Fitch.—Aweme, VII, 9 to 26. (New York to Texas.)

Tortrix peritana, Clem.—Aweme, VII, 21 to 28. (Atlantic States.)

Tortrix conflictana, Walk.—Aweme, VI, 18, Cartwright. (No. Atlantic States.)

Tortrix hortariana, Wlsm.—Winnipeg. Type from Oregon, and not since recorded.

Eulia quadrifasciana, Fern.—Cartwright. (No. Atlantic States.)

Eulia triferana, Walk. Aweme, VI, 16; Beulah. (Atlantic States.)

Phalonia vitellinana, Zell.—Rounthwaite, July; Aweme, VI, 14 to 25; Cartwright. (Maine to Mass.)

Phalonia angustana, Clem. (*promptana*, Rob.)—Beulah, VIII., 15. (Penna. and Texas.)

Phalonia angulatana, Rob.—Rounthwaite, June; Aweme, VII, 29; Winnipeg, VI, 18. (Penna. and Texas.)

Phalonia Smeathmanniana, Fab.?—Rounthwaite, June. Name subject to correction. (Europe, Maine and California.)

Phalonia bunteana, Rob.—Rounthwaite, July. (Atlantic States.)

Phalonia anotherana, Riley.—Rounthwaite, Aug.; Aweme, VI, 8, VIII, 3, and X, 13. (Atlantic States.)

Hysterosia inopiana, Haw.—Rounthwaite, June and July; Aweme, VII, 2; Beulah, VIII, 15; Cartwright. (Europe and Northern United States.)

(To be continued.)

NEW SPECIES OF NOCTUIDÆ FOR 1905.—No. 2.

BY JOHN B. SMITH, SC. D., NEW BRUNSWICK, N. J.

(Continued from page 204).

Mamestra ascula, n. sp.—Ground colour very pale ashen gray, with a somewhat luteous tinge more or less obvious in most specimens; best marked in the male, most frequently wanting in the female. The ordinary lines are all broken and obscured by the shading, yet all distinctly traceable, geminate, one part of the line blackish, the other smoky and always partly incomplete. Basal line usually marked by a geminate spot on costa. There is a short black basal streak, best marked and a little curved in the female, and above it the basal space tends to be a little paler. T. a. line well removed from base, with a rather even outcurve, just a little drawn in on the veins. T. p. line outcurved over the cell, very obscurely marked in that part of its course, best marked on the incurve in the submedian interspace, where the included space is paler and the defining lines are well marked. A pale shading extends from that point to the hind angle, and another from the end of the cell to the apex; the latter is almost always present; the former is sometimes poorly marked. S. t. line irregular pale, sometimes defined by preceding black marks, sometimes only by the darker terminal space; always with a blackish shade above the hind angle, usually emphasized by white scales at this point. There is a series of blackish terminal lunules, a pale line at the base of the fringes, a blackish interline and an alternation of light and dark gray at the edge of the wing. The orbicular is long, narrow, very oblique, usually well defined, with blackish outer border and a white annulus. The reniform is of good size, rather narrow, oblong, with the angles rounded, though sometimes more kidney-shaped, usually well defined, though the defining lines are narrow and not contrasting; it may be concolorous, dark filled or of the palest gray in the wing, and in the male often has a slight ocherous tinge. Claviform usually small, inconspicuous, pointed, defined by blackish scales, sometimes extending across the median space, but never prominent. Secondaries in the male white, the veins sometimes marked with smoky near the margin; in the female a little smoky throughout, becoming dusky outwardly. Beneath, more or less powdery, primaries with disc darker; sometimes immaculate, sometimes with a well-defined blackish outer line, more rarely with a discal spot on all wings.

Expands: 1–1.20 inches = 25–30 mm. *Habitat:* Stockton, Utah, in September; Mr. Thomas Spalding.

July, 1905.

There are about 200 specimens before me, nearly evenly divided as to sex, and most of them in very good condition. The males are as a whole decidedly paler in colour than the females, and the tendency to the yellowish shading is best marked. The relationship is to *vicina*, which is darker, more bluish gray, has the claviform prominently marked and the ordinary spots of different form. There are other differences, but these will suffice to distinguish the new form.

Hadena erica, n. sp.—Ground colour bluish ash gray, marked with darker gray and blackish. Head with a black frontal line; collar with a narrow blackish line; patagia with a blackish submargin, disc powdered with blackish. Primaries with the lower half of basal space, the apical region and the submedian interspace between t. p. and s. t. lines much paler gray and with an ochreous tinge, giving the wings the appearance of having three pale blotches; this feature more obvious in the female. Basal line geminate, often lost, extending to a short black somewhat curved basal mark. T. a line geminate, inner portion vague, gray, outer blackish; the line as a whole a little outcurved and somewhat drawn in on the veins. T. p. line geminate on the costa, the outer portion lost before it is curved over the cell, the incurve deep. The s. t. line is pale, marked just before the apex, well drawn in and obscured by the apical pale area, and then with a very even and well marked bisinuation to the inner margin. There is a series of black terminal lunules and a yellow line at the base of the fringes which are cut with blackish. The orbicular is ovate, usually well defined, edged with black scales, with a whitish annulus, concolorous or paler gray. Reniform oblong, a little oblique, sometimes constricted, occasionally nearly kidney-shaped, inwardly marked by a whitish, outwardly by a black line, top and bottom not well defined. The claviform is black lined, large, broad, usually extending across the median space, concolorous. Secondaries whitish in the male, smoky in the female, veins blackish marked, a more or less defined extra-median line and a discal lunule. Beneath gray, powderings of primaries in the female nearly black, secondaries with an outer line and discal spot.

Expands: 1.12–1.32 inches = 28–32 mm. *Habitat:* Stockton, Utah, June and July.

Nine males and eleven females, most of them in good condition, from Mr. Tom Spalding. There is little variation, except what is due to the differences in contrast. The species is allied to *characta*, Grt., but differs obviously when a series is at hand.

Spragueia fumata, n. sp.—The entire insect is deep smoky brown, immaculate. Head, thorax and primaries covered by smooth glistening scales, giving the appearance of being covered with bronze or metallic green atoms. Secondaries with a slightly more reddish tinge, lustrous, but without the metallic reflections. Beneath, like the secondaries above.

Expands: .64–.74 inches = 16–18 mm. *Habitat:* Verdi, Nevada, June 1–10; A. H. Vachell.

Twelve examples are before me, almost evenly divided as to sex. Nine of these I owe to Mr. Kearfott, and three are from the collection of Mr. H. D. Merrick.

Yrias irentis, n. sp.—Ground colour a reddish gray, more or less suffused by smoky gray and brown. The markings are fairly well defined, blackish, not prominent, the only contrasts being where the reddish ground is free from smoky powderings just beyond the reniform. Thoracic vestiture gray, mixed with pink scales, which form a crest on the collar. Primaries with all the lines and spots present, but varying much in distinctness, sometimes one or the other being lost or broken. Basal line of the reddish ground, defined by slightly darker edgings. T. a. line geminate, broken, nearly upright, outer portion blackish and most persistent; inner smoky and frequently lost. T. p. line single, lunulate, blackish, more or less broken, followed by a paler shading, with a long outcurve from costa over cell, and a small incurve toward inner margin. The median shade is somewhat diffuse, at or within the middle of the wing, nearly upright. The s. t. line is narrow, whitish, irregularly bent and curved, broken and tending to become lost toward the hind angle. There is a series of black terminal lunules, followed by a flesh-coloured line at the base of the long fringes, which are cut with reddish opposite the interspaces. The orbicular is a black dot in the cell touching the t. a. line, and is sometimes wanting. The reniform is black, not defined at the edges, variable in size and shape, but usually distinct, at just about the middle of the wing. Secondaries smoky gray, with a more or less obvious tendency to continue the transverse lines of the primaries; always best marked toward the inner margin. Beneath yellowish gray, with three lunulate transverse darker lines on each wing; secondaries also with a discal dot.

Expanse: .70–.75 inch = 17.5–18.5 mm. *Habitat:* Cochise County, Arizona, in July.

Three males and one female, all papered specimens, from Mr. George Franck. No two are alike, and the variation is due chiefly to the amount

of gray suffusion, which obscures or leaves the maculation in relief. The species is most nearly allied to *Y. albiciliatus* in general type of maculation, but is much nearer the typical forms in colour. In the tendency to relieve the reniform, it resembles *Homopyralis*.

Homopyralis cinctus, n. sp.—Ground colour a pale reddish luteous, on which the markings are shown in smoky or black. Head of the ground colour mottled with bronze brown scales. Palpi brown, banded with the reddish ground. Thorax of the reddish ground with a band of smoky, lustrous brown scales across the top of collar and another at the base. Abdomen concolorous. Primaries reddish luteous at extreme base; then brown to the t. a. line. T. a. line rigidly oblique inwardly, from costa beyond inner fourth to the inner margin at the inner fourth; geminate, the inner margin formed by the brown shade, the outer by a narrow brown line parallel to it, the included space of the ground. T. p. line geminate, a little sinuate, nearly parallel with the outer margin, the outer border formed by the brown space which extends to the outer margin, the inner by a narrow brown line parallel to it. The median space is thus paler than and contrasting with that on each side, a little darkened in the middle by a geminate dusky median shade. The brown space beyond the t. p. line is deepest at the line and on the costa, and lightens a little outwardly, being also interrupted by the irregularly sinuate, diffuse, pale s. t. line. There is a lunulate brown terminal line. Orbicular wanting in the specimen. Reniform black, moderate in size, oblong, a little oblique. Secondaries a little lighter than the primaries, the median shades, t. p. line and outer dark shading of primaries continued across the wing; a blackish discal spot partly obscured by one of the transverse lines; a narrow, lunulate brown terminal line. Beneath, yellowish, with black discal spot and vague transverse shades on all wings.

Expands: .68 inches = 17 mm. *Habitat:* Bill Williams Fort, Arizona, in August.

One female specimen in good condition from Prof. F. H. Snow. Readily recognizable by the broad reddish luteous median space between the dark brown base and outer part of wing.

Epizeuxis Merricki, n. sp.—Ground colour a glistening sooty black, tending to smoky when a little worn. Head and thorax concolorous, immaculate. Primaries with the transverse maculation obvious in most specimens, becoming clearer as the specimen is rubbed. T. a. line single blackish, diffuse, almost upright, and may be tilted a little to either side,

so as to be either inwardly or outwardly oblique. A broader, diffuse dark median shade, which is usually just at or a little within the middle of both costal and inner margins, and therefore inwardly oblique. T. p. line incepted by a whitish outcurved mark on the costa, then obscurely traceable across the wing as a crenulated dusky line, more or less emphasized by outward, pale defining scales. S. t. line irregular, whitish, tending to become lost. The reniform is vaguely indicated by a dusky blotch in some examples. Secondaries dull grayish white, with a smoky tinge which forms a broad sub-basal and a yet broader extra median dark band, the inner margins of each diffuse. Between these bands is a narrower, better defined blackish line. There is also a broken, dark terminal line. Beneath, both wings whitish, powdered with blackish scales, with irregular and variable transverse dark bandings and shades; the primaries with a discal spot.

Expands: .75–.82 inches = 19–21 mm. *Habitat:* New Brighton, Penna., July 20–Aug. 2 (H. D. Merrick); Chicago, Ills., July 12 (A. Kwiat).

Eight examples, six of them males, are before me. All were received from Mr. Merrick, and all save one are of his collecting. Most of the examples are good, and far above the average for species in this group.

In size and general appearance this resembles *rotundalis*, and I have little doubt I have so determined it from single examples; but I had none like it in my own material. The occurrence of a sufficient number to make comparisons shows a species tending to the *æmula* type of maculation with a remarkably even basal and median transverse shade.

Aphodius Erraticus, Linn., at Halifax, N. S.—In the Canadian Entomologist for last year (Vol. 36, p. 164) Mr. Charles Stevenson mentions the fact of *Aphodius erraticus*, Linn., having been taken by his son on Montreal Island, and states that he can find no previous record of its being taken in Canada.

When I was in Halifax in 1897, I took a number of specimens of this insect, and the list of Coleoptera taken in Halifax that year is given in the Canadian Entomologist, Vol. 31, p. 321, where the above mentioned name will be found.

John D. Evans, Trenton.

[Mr. Evans has very kindly presented some specimens of this beetle to the Society's collection, and also a number of other species of Coleoptera from the Northwest and British Columbia, which are very acceptable indeed.]

THE LARVA OF *EUPITHECIA INTERRUPTOFASCIATA*, PACKARD.

BY JAMES FLETCHER AND ARTHUR GIBSON, CENTRAL EXPERIMENTAL FARM, OTTAWA.

On May 19, 1904, Mr. W. Metcalfe found some green Geometrid larvæ, at Hull, Que., feeding on the common Juniper (*Juniperus communis*, L.). These were handed to the writers, who succeeded in bringing them to maturity. Three of the bred moths were sent to the Rev. G. W. Taylor, of Wellington, B C., for identification. Writing under date of Nov. 26, Mr. Taylor says:

"I return two of the three bred specimens of *Eupithecia* sent me for study. They are undoubtedly *E. interruptofasciata*, Packard, which is not the same as *E. miserulata*, Grote. I have specimens of the latter from Pennsylvania which accord exactly with Grote's description, and the differences between these and yours are evident at once.

"*E. miserulata* has not a black band on second segment of abdomen. It has a small linear discal dot on fore wings. The outer margin of fore-wings is very straight. It flies in April and May.

"*E. interruptofasciata* has a conspicuous black band on second segment of abdomen. It has a large round discal spot on fore wings. The outer margin of fore wings is rounded and full. It flies in August and September.

"The first two points in each case are taken from the original descriptions, the two others from my own observations of my specimens. All the eastern Eupithecias (of which there may be 9 or 10 kinds), are lumped in most cases under the one name *miserulata*. It is the only species I have ever had offered to me in exchange."

In Packard's Insects Injurious to Forest and Shade Trees (5th Report U. S. Entomological Commission), there are no fewer than five descriptions of the larva of *E. miserulata*. These descriptions vary noticeably, and it certainly looks as if at least two distinctly different larvæ have been described under this name.

The following is a description of the larvæ found at Hull, Que.:—

Length, 16 mm., dark green, almost the same colour as the older leaves of the food-plant. Head paler than the body, and much smaller than segment 2. Body cylindrical, but appearing as if flattened dorsally. Dorsal vessel darker than body; subdorsal stripe whitish, rather indistinct; stigmatal band whitish, margined above with yellow, particularly at centre

of each segment. Tubercles inconspicuous, each bearing a single short black hair. Venter slightly pruinose; feet concolorous with body.

On the 24th May two of the larvæ pupated in among the leaves of the food plant, the pupæ being enclosed within a slender covering of silk.

Pupa—8 mm. long, pale brown, the abdomen pitted and darker than the wing covers and thorax. Cremaster consisting of 10 or 12 slender, hooked spines, upon a thickened plate which covers the greater part of the last segment.

The moths emerged on the 7th Sept., 1904.

From the above description it will be seen that our larvæ resembled, rather closely, those found feeding on Juniper, at Salem, Mass., and referred to under the name *E. miserulata*, on page 910 of Packard's Insects Injurious to Forest and Shade Trees. On 21st May, 1905, 8 more larvæ were found in the same place. Four of these differed from the above description in having no subdorsal stripe.

NOTE ON COLLECTING HIBERNATING SPECIMENS.

BY J. W. COCKLE, KASLO, B. C.

Acting on the information given me by a woodchopper who had seen hundreds of green flies under the bark of a tree he had felled a few days previously, I made a further investigation, and upon reaching the locality found several dead Lace-wing flies crushed under the bark of a Tamarack tree he had been sawing up. Furthur search under the bark of a tall dead Tamarack (*Larix occidentalis*) which had just been felled, resulted in a rather unique catch on removing the bark, which peeled off easily from the butt end, hundreds of lively specimens of the minute Tineid, *Lyonetia speculella*, Clem., were found. Proceeding with the stripping towards the top, and at from 20 to 50 ft. from the butt, numerous specimens of the Tortricids, *Proteopteryx Columbia* (Kearfott), including both of the described varieties *Albidorsana* and *Mediostrania*, were seen. About 50 ft. up were dozens of a whitte barred *Elachistid* (*Mompha*, sp.). Also one specimen of *Orneodes hexadactyla*, L. The dates which I have previously recorded for this species were the first week in May and the end of July. Dr. Dyar mentions a specimen from me April 24th, and one he bred here July 13th. There are, therefore, apparently, two broods, the moths of the latter of which hibernate, and appear again in the spring, and a single specimen of *Depressaria Klamathiana* (Walshingham). A few Gelechiidæ were found in the next 30 feet, and at this point (corresponding in the case of both of the trees

examined), at a height of about 80 to 100 ft. from the ground, were discovered several dozens of a Lace-wing fly, *Chrysopa*, sp.

The occurrence of all of these insects in so secure a resting-place may be accounted for from the fact that the sapwood had been eaten out by Borers. The woodpeckers in their search for food had punctured numerous holes in the outer bark, leaving an easy entrance for these small flies and moths to the dry chamber formed between the bark and the shrunken stem of the tree.

But the curious part of the whole circumstance was the relative positions of the species. Few specimens of Lyonetia were seen above 15 feet. The Gelechiidæ and Tortricids were all closely associated at greater heights, and all the Chrysopas were in a comparatively small area and near the top of the tree, not a single specimen being discovered in either tree below the limit of 80 feet.

The date of the above trip was March 2nd, 1905; there was about two feet of snow on the ground, but a thaw having set in a few days previously no doubt accounted for the activity of many of the specimens taken.

The woodchopper tells me that nearly a mile away from the trees mentioned above, he found another tree, a dry Tamarack, with the same kinds of insects beneath the bark. He brought me several specimens in a cyanide bottle which I had given him. Again the Lace-wing flies, and the other moths associated with them, were at the top of the tree.

HYDROMETRA AUSTRALIS, Say.

BY J. R. DE LA TORRE BUENO, NEW YORK.

Since my "Notes on *Hydrometra Martini*, Kirk.," in the CANADIAN ENTOMOLOGIST for January of this year, pages 12 to 15, I have had the opportunity of examining another specimen of Say's "var. *australis*," and study of it confirms the conclusions I then drew. It is unquestionably a good species and not merely a variety, and it affords me real pleasure to recognize a true Hydrometra of which Say is the author. The specimen to which I here refer is also a male and was taken by Mrs. Annie Trumbull Slosson, at Jacksonville, Florida. Since Say gives his locality as "Louisiana" and my specimen came from Thomasville, Georgia, the bug would seem to have quite an extended range along the Gulf of Mexico and on the warmer shores of the Atlantic Ocean. Lack of material, especially of females, makes it unwise to draw up an extended description at present, but it should be done in order to establish the species beyond peradventure.

SOME BEES COLLECTED BY THE REV. G. BIRKMANN AT FEDOR, TEXAS.

BY T. D. A. COCKERELL, BOULDER, COLO.

Emphoropsis Birkmanni, n. sp.

♀.—Length about 15 mm.; similar in size, build and pubescence to *E. floridana* (Sm.), except that the hair of thorax above is entirely bright orange-fulvous; hair of occiput and vertex (except some black hairs at sides, but including the conspicuous interocellar tuft) is pale orange-fulvous; and the wings are not so dark. From *E. rugosissima*, Ckll., it differs by the colour of the pubescence of the thorax, and the long hair at sides of first abdominal segment black (white in *rugosissima*). The lateral hind margins of the first segment have a white fringe, which is the more conspicuous by contrast with the black in front of it. The hair of the legs, abdominal venter, pleura (except the upper part, as in allied forms), cheeks and clypeus is black.

Hab.—Fedor, Texas, 2 ♀'s *(Birkmann)*. March 29 and 30. The *floridana* group includes several closely allied forms, separable in the ♀ thus:

Hair of cheeks black 1.
Hair of cheeks white; of thorax above bright orange-fulvous 3.
1. Hair of occiput black (Fla., Ga.) *floridana* (Sm.).
Hair of occiput whitish or fulvous 2.
2. Hair of thorax above yellowish-white (Nevada) *rugosissima*, Ckll.
Hair of thorax above bright orange-fulvous (Texas) .. *Birkmanni*, Ckll.
3. Hair of face and vertex with black intermixed (Wash.) .. *pascoensis*, Ckll.
Hair of face and vertex without black intermixed (Colo., New Mexico) n. sp., Viereck, ined.

E. floridana (Sm.) also occurs at Fedor, the ♀ taken March 25, the ♂ April 9. The insect, however, is not typical, but may rank as a variety, thus:

Emphoropsis floridana, var. *Fedorensis*, n. var.

♂.—Hair of occiput black, of thoracic dorsum and first abdominal segment white, with practically no yellow tint; spurs yellowish-white (black, with reddish ends, in *floridana*); apical plate of abdomen narrower at end.

♀.—Hair of first abdominal segment with much black (all light in *floridana*); pygidial plate broader at end, truncate, with five transverse file-like lineolæ. Although the hair of the thorax above (yellowish-white

in colour) in this and true *floridana* is described as being without black, in both there are a *very few* black hairs, which can be seen if looked for. This is not true, however, of the males.

The known males of *Emphoropsis* similar to *floridana* may be separated thus :

Hair of thorax above with black conspicuously intermixed 1.
Hair of thorax above without black intermixed 2.

1. Hair of abdomen beneath all black ; scape entirely black (Calif.) *interspersa*, Ckll.
Hair of abdomen beneath largely pallid, at least in certain lights; scape white in front (Calif.) *semifulva*, Ckll.

2. Scape white or yellowish in front (Colo.) *Morrisoni* (Cresson).
Scape all black 3.

3. Hair of occiput black ; spurs yellowish-white *floridana Fedorensis*, Ckll.
Hair of occiput light ; spurs dark *floridana* (Sm.).

Xenoglossa strenua (Cresson).

The Fedor insect is the typical red-legged form, not the dark-legged var. *Kansensis*, Ckll., which Snow obtains in Kansas.

Melissodes melanosoma, n. sp.

♂.—Length just over 12 mm. ; black, pubescence entirely black, except on the face, labrum, part of occiput, outer side of all the tarsi and of hind and apical half of middle tibiæ, where it is white ; wings dark fuliginous; clypeus light lemon yellow, with the usual black spot on each side ; labrum dull whitish, the lateral margins black ; flagellum ferruginous beneath, except apical half of last joint. Agrees with *M. bimaculata*, Lep., except in having the spurs piceous, and the hair of thorax and abdomen wholly black, above and below ; it is also a little larger than *bimaculata*. It may prove to be only subspecifically distinct, as *bimaculata* itself is quite variable.

Hab.—Fedor, Texas, May 26, 1904 *(Birkmann)*. The males of the black *melissodes* of the *bimaculata* group may be separated thus :

Clypeus entirely black ; abdomen and legs without white hair (Mexico) *pernigra*, Ckll.
Clypeus black with a semicircular yellow spot or patch ; abdomen with some white pubescence (Mexico) ... *atrata*, Smith.
Clypeus yellow, with a black dot on each side ; hind legs with much white hair 1.

1. Abdomen and thorax with the hair entirely black (Texas)..... : *melanosoma*, Ckll.
Abdomen with conspicuous white hair at sides, at least.....2.
2. Hair of pleura and mesothorax largely dull white (S. Illinois, *Robertson*).....*bimaculata*, Lep., var. a.
Hair of pleura and mesothorax black 3.
3. Mandibles with a large yellow spot (Baldwin, Kansas, July, *Bridwell*).....*bimaculata*, Lep., var. b.
Mandibles with at most a very minute yellow dot (Ames, Iowa, *E. D. Ball*).....*bimaculata*, Lep., var. c.

A specimen of *bimaculata* from New York State has the hair of pleura and mesothorax all black, so this is not especially a character of western examples. The most western locality I know for *M. bimaculata* is Wellsville, Kansas, where both sexes were taken by Mr. S. A. Johnson.

Anthedon compta (Cresson).

Both sexes of this magnificent species were taken at Fedor, June 19, 1899. It is new to the fauna of Texas.

Anthophora abrupta, Say.

Fedor; the female, April 8, 1904; males, April 27 and 29. Unless the venation is examined, this will be likely to be confused with *Emphoropsis floridana Fedorensis*.

BOOK NOTICES.

A CATALOGUE OF THE ERYCINIDÆ OF THE WORLD.—By Levi W. Mengel, Professor of Natural History, Boys' High School, Reading, Pa. I vol., pp. 161. (Price $2.00.)

This very full and comprehensive work will be of great value to all students of Butterflies who do not confine their attention to the species inhabiting their own country. It is similar in arrangement and style to Dr. Skinner's well-known Catalogue of North American Rhopalocera, giving full bibliographical references and habitat for each species. Its extent may be realized by the following comparison: In the genus *Libythea* Dr. Skinner gives 2 species and Prof. Mengel 21; in the subfamily Lemoniinæ the former has two genera, including 11 species, the latter 86 genera and an enormous number of species. The book is very clearly printed and is made complete by a full index of all the species and synonyms contained in it. It may be obtained from the author.

ENTOMOLOGEN-ADRESSBUCH.—By W. Junk, Rathenower Strasse 22, Berlin, N. W., Germany. (Price 5 marks.)

This directory of Entomologists throughout the world contains about 9,000 names and addressess, with in most cases the special orders or families of insects to which the individual is devoted. The list is arranged under countries, but there is added an alphabetical index which increases its convenience very much. The volume includes also a catalogue of over one hundred pages of new and second-hand books for sale by the publisher.

GENERA INSECTORUM.—Published by P. Wytsman, Brussels, Belgium.

Fascicule 24—Heteroptera: family Pentatomidæ, sub-fam. Scutellerinæ, by H. Schouteden. This part consists of 98 pages, with five coloured plates on which are depicted about 80 species of Bugs, and several drawings in the text. It is written in French.

Fascicule 25—Isoptera: family Termitidæ, by Jules Desneux (also in French), contains 52 pages and two coloured plates showing 12 species of "White-ants," with many details of structure.

Fascicule 26—Diptera: family Culicidæ, by Fred V. Theobald (in English), contains 50 pages and two coloured plates showing 24 species of Mosquitoes.

These parts are all on the same general plan, giving a full description of the family treated of, keys to sub-families and genera, the characters of each genus and a list of species with geographical distribution and bibliography. They are of very great value to those studying the particular group of insects treated of, but there is a difficulty in procuring them, as subscriptions are apparently taken only for the whole work, and the parts are not sold separately. As the entire cost will probably approach $400, very few students of Entomology can afford such an outlay, while many would be delighted to purchase for a few dollars the part in which they are specially interested.

REPORTS OF THE EXPERIMENTAL FARMS OF THE DOMINION FOR 1904.—This goodly volume of over 500 pages contains a vast fund of information on every variety of subject that can interest the farmer, fruit-grower or gardener. In the portion furnished by Dr. Fletcher (pages 205-256), there are descriptions of a large number of insects affecting cereals and field crops, roots and vegetables, fruit crops, and forest and shade trees; special attention is drawn to the Pea-weevil and Cut-worms among many other insect foes which have to be contended with. He also furnishes in the Botanical portion, an account of the injury to grain crops by Rust last year, which was most exceptional in extent, owing, evidently, to peculiar atmospheric conditions.

Mailed June 29th, 1905.

The Canadian Entomologist.

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PRACTICAL AND POPULAR ENTOMOLOGY.—No. 8.

A METHOD OF MEASURING INSECTS.

BY J. R. DE LA TORRE BUENO, NEW YORK.

The common callipers ordinarily sold for measuring insects have always seemed to me too coarse for fine work. In the Hemiptera especially, where there is an abundance of small forms, they would certainly be useless for the delicate measurements of antennæ and limbs so frequently necessary, and for the proportional dimensions called for in the determination of species. While endeavouring to solve this problem, my set of drawing instruments came to my mind, and with the bow-dividers (Fig. 12) the difficulty was partially solved. I ground the points flat and parallel, to knife-edges. Now, by means of the screw of the dividers and by the use of a magnifier, it was possible to make direct measurements of parts of an insect, such as diameter and length of limbs and antennæ, dimensions of the segments, etc. The next problem was an accurate scale. In looking over the machine-tool catalogue of Brown & Sharpe, Providence, R. I., I ran across the cut of a little steel scale (Fig. 13) 5 cm. long, graduated on one side to centimeters, millimeters and 5ths of a millimeter; and on the other to inches, halves, quarters, eighths, 64ths and 100th. With these two appliances I can make measurements to within one-tenth millimeter or less. As to the manner of using them, whoever has the instruments will at once see the way, without my entering into a prolix explanation. The cost of the scale is trivial (25 cents); the dividers are more expensive. I believe they cost something more than a dollar.

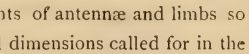


Fig. 12.

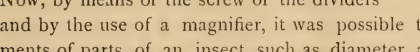


Fig. 13.

NEW SPECIES OF COLEOPTERA, CHIEFLY FROM THE SOUTHWEST.

BY H. C. FALL, PASADENA, CAL.

The following species of Coleoptera are sufficiently isolated or conspicuous to warrant their description apart from any monographic treatment of the genera to which they belong. The types of the three species sent by Prof. Snow remain in his collection, or rather that of the University of Kansas; the types of the remaining species are in the writer's collection.

Cardiophorus Arizonicus, n. sp.—Form rather slender, black, moderately shining, elytra each with a humeral stripe, and the apex testaceous, antennæ and legs pale, the thighs dusky; pubescence short, recurved, yellowish brown, becoming paler on the pale areas of the elytra. Second joint of antennæ three-fourths longer than wide (following joints missing); frontal margin simple. Prothorax just visibly longer than wide, sides parallel and very feebly arcuate in basal four-fifths, surface shining and finely punctate with scattered larger punctures; fine punctures separated on the average by their own diameters or slightly less; basal striæ long, their length slightly greater than their distance from the side margin. Elytra a little wider than the thorax, moderately convex, sides parallel, gradually narrowed behind the middle, apex not acuminate, intervals a little convex, finely sparsely punctulate, moderately shining; humeral stripe extending from the base two-fifths the length of the elytra, and from the fourth stria to the margin; apical pale area about as long as the basal laterally, but shorter at the suture. Beneath finely but more densely punctured than above, submarginal line of prothorax cariniform, reaching beyond the middle. Prosternal process feebly ascending, the impressed marginal lines finer posteriorly, but reaching nearly to the tip.

Length, 7.5 mm.; width, 2.2 mm.

Arizona (Oak Creek Canon, 6,000 feet, July). A single male specimen sent by Prof. Snow.

By Blanchard's table—"Trans.," XVI (1889), p. 4—this species would fall near *longior*, from which and all our other species it differs in the elytral coloration.

Agrilus Snowi, n. sp.—Very robust, black, feebly shining, thorax bronzed, head greenish; pubescence short, white, rather sparse and evenly distributed, with dense white efflorescence at the sides of the pronotum, in

the basal depressions of the elytra and throughout the wider surface. Antennæ slightly longer than the vertical diameter of the eye, serrate from the fourth joint, outer joints transverse. Head coarsely punctate, feebly concave, with fine median impressed line ; front with a shallow rounded impression each side the median line. Prothorax wider than long, sides as viewed from above straight and parallel in basal half, then narrowed and nearly straight to apex ; anterior margin broadly arcuate at middle, hind margin deeply sinuate each side, the median lobe truncate and a little emarginate; surface uniformly feebly convex, without costæ or depression except the carinæ of the hind angles, which are well defined and nearly half the length of the thorax ; punctuation similar to that of the head, and not forming rugæ or strigæ. Scutellum not carinate. Elytra parallel, sides moderately sinuate at middle, surface evenly convex except for the basal depressions, rather finely imbricate, apices separately rounded and minutely serrulate ; pygidium not carinate. Body beneath with dark greenish lustre, except the legs, which are bronzed ; pubescence more abundant than above, and with the dense efflorescence nearly concealing the surface ; prosternum broadly arcuato-truncate in front, the intercoxal process broad and subtruncate at tip ; first ventral suture visible from side to side, margin of last ventral not distinctly serrate. Front tibiæ arcuate, inner apical angle mucronate ; middle tibiæ slightly arcuate, and with a small mucro at tip ; hind tibiæ straight, simple ; claws with a moderate tooth, which is not inflexed, and is a little longer in the anterior pair.

Length, 9.5 mm.; width, 3 mm.

Arizona, " Bill Williams Fork " (Snow).

The type is a male, judging from the arcuate and mucronate tibiæ, but there are no prosternal or ventral characters to support this view. The very broad form gives it a facies entirely different from any of the known species of our fauna, nor is there anything like it in the "Biologia," as I am informed by Mr. Blanchard, who kindly investigated this point for me. By Horn's table the present species would be associated with *Walsinghami* and *pulchella*, in which the first ventral suture is better developed than elsewhere. Notwithstanding the decidedly *outre* appearance of *Snowi*, there appear to be no grounds for generic separation. It may be noted that the submarginal carina of the protharacic flanks is more nearly parallel to the margin than in any other species known to me.

Cheiroplatys verticalis, n. sp.—Black above, castaneous or blackish-castaneous beneath. A little smaller than *clunalis*, from which it differs chiefly as follows: Body more distinctly wider behind, cephalic tubercle very obviously more posterior in position; prothorax much more sparsely and finely punctate in front, side margins a little stronger, front margin without trace of median prominence, basal marginal groove deeper, and nearly equally strong throughout; ventral segments more punctured, apex of middle and hind tibiæ strongly crenulate and with fewer spinules; front tibiæ acutely tridentate. There are some other small differences which may or may not be specific in nature.

Length, 22–23 mm.; width, about 13 mm.

Las Vegas, New Mexico.

Two examples, both apparently females, sent by Prof. Cockerell. It is not unlikely that specimens of this species will be found mixed with *clunalis* in collections; if so, the characters given above are amply sufficient for its recognition. I have compared with Fairmaire's descriptions of Mexican species, and do not find any mention of the points which I rely upon here. Bates, in the "Biologia," gives four Mexican species, viz., *cultripes*, *clunalis*, *Fairmairei* and *isodonoides*. The first, he says, is "barely distinguishable from *clunalis* by the immarginate base of the prothorax. Under *clunalis* he places Fairmaire's *Sallei* and *marginatus*, and a study of the descriptions convinces me that this course is correct. Both *Fairmairei* and *isodonoides* are distinctly smaller species than *verticalis*.

Gymnetis impius, n. sp.—Smaller and less robust than *Sallei* or *cretacea*, upper surface in typical specimens uniformly velvety black, without sculpture or markings; lower surface shining black, with greenish reflections. In many examples the prothorax and elytra are entirely brownish yellow, in which case the velvety aspect is less pronounced, and there are visible faint lines of minute punctures on the elytra, and very fine scattered punctures toward the sides of the prothorax. These examples may or may not be fully mature. Clypeus widely reflexed, front concave and acutely longitudinally carinate; basal lobe of thorax acutely rounded, lateral marginal bead strong; mesosternal epimera punctured and hairy above; sutural angles of elytra divergent and a little prominent; metasternum rather densely punctured at sides, smooth at middle, its intercoxal process flat and obtusely rounded in front.

Length, 17–18 mm.

Fort Huachuca, Arizona.

Euphoria limbalis, n. sp.—Smaller than *fulgida;* upper surface polished; entire disk of thorax and elytra of a uniform green, rather less brilliant than in *fulgida;* side margins of thorax and elytra brownish testaceous, legs in great part testaceous. Head as in *fulgida;* prothorax with the sides distinctly less strongly convergent from base to apical third, disk more coarsely and numerously punctate, the punctures nearly even in size and distribution throughout; lateral bead slightly stronger than in *fulgida*. Elytra rather more coarsely punctate than in *fulgida*, and with numerous small cretaceous spots. Pygidium entirely testaceous, with four cretaceous spots; ventral segments more or less tinged with testaceous, the terminal segment entirely of this colour; first five segments with a cretaceous spot at the lateral margin. Sculpture beneath and legs nearly as in *fulgida*, except that the ventral segments are more evidently though very sparsely punctate.

Length, 12 mm.

Enterprise, Florida. A single female specimen given me by Mr. Schwarz.

Euphoria holochloris, n. sp.—Moderately brilliant green above, slightly darker at sides of elytra and beneath, surface lustre feebly bluish in certain lights, the under side and legs distinctly blue-green, tarsi black; cretaceous spots entirely wanting. Prothorax a little less strongly narrowed from the base and scutellum, less elongate than in *fulgida;* otherwise nearly as in the latter species.

Length, 16–17 mm.

Fort Huachuca, Arizona, 2 ♂'s, 1 ♀. Kindly given me by Mr. F. S. Daggett, in whose collection are numerous examples.

I have seen examples of this species in both the LeConte and Horn collections; in the former it is properly separated, but in the latter it stands with *fulgida*. Aside from the differences mentioned above, it should be noted that in the male of *fulgida* there is a group of very fine punctures at the middle of the first three or four ventral segments, no trace of which appears in *holochloris*.

The statement made by Horn that the upper surface in *fulgida* is "entirely void of pubescence," is not strictly true, there being, especially on the elytra, numerous very short suberect hairs, which are distinct enough in well-preserved specimens of all the above mentioned species, which may be separated as follows :

Legs in great part pale ; pygidium, sides of the abdomen, and frequently the elytra with cretaceous spots.

Prothorax nearly as strongly punctured at middle as at sides ; less strongly narrowed from base ; elytra green, with testaceous margin *limbalis.*

Prothorax much more sparsely and finely punctate at middle than at sides; more strongly narrowed from base; elytra uniform in coloration, varying from green to brownish yellow..... *fulgida.*

Legs concolorous with the lower surface ; cretaceous spots lacking ; scutellum less elongate..... *holochloris.*

Prionus heros, n. sp.—Nearly black, the under surface and legs tending to castaneous in the female. Form very robust, prothorax nearly as wide as in *laticollis*, but distinctly more coarsely and densely punctate than in that species, sex for sex ; lateral teeth more acute than in *laticollis*, but less so than in *Californicus*. Elytra moderately shining, the raised lines sharply defined in the male, feeble in the female, punctuation nearly as in *Californicus* in the female, coarser in the male, but not at all rugose. Antennæ 12-jointed, of the usual form. Prosternal process strongly ascending at tip when viewed laterally, more inflated apically and subhorizontal in *laticollis*. Metasternum moderately hairy in the male, nearly glabrous in the female. Soles of hind tarsi densely spongy pubescent, with a distinct median channel which is wider on the basal joint, and evidently wider on all the joints than in *laticollis*. In the female the median channel is still wider, and is well marked in the middle tarsi, scarcely so in *laticollis*.

Length, 40 (♂) ; 48 mm. (♀).

Described from a single pair taken in Southern (?) Arizona.

Heros should stand between *laticollis* and *Californicus*, differing from the former in its larger size, more coarsely punctate prothorax, with more acute lateral teeth, smoother elytra, strongly ascending prosternal process, and less completely pilose tarsal soles. From *Californicus* it differs in its more robust form, wider prothorax and glabrous metasternum in the female. There do not seem to be any Mexican species with which the present one can be confused, both *Flohri* and *Mexicanus*, the only species accredited to that region in the "Biologia," differing in the number of antennal joints, thirteen in the former and fourteen in the latter.

Alæphus nitidipennis, n. sp.—Elongate, rufo-testaceous, head and thorax opaque, elytra strongly shining ; pubescence very fine, sparse, pale in colour, and extremely inconspicuous. Eyes rather large, plainly more prominent than the sides of the front, separated beneath by a distance not much less than twice the length of the second antennal joint.

Antennæ slender, filiform, two-fifths the length of the body, the eighth joint reaching the hind angles of the prothorax ; fourth joint very nearly four times as long as wide ; outer joints decreasing a little in length, the ninth and tenth feebly obconical, the eleventh fusiform, pointed, and equal in length to the tenth. Prothorax one-third wider than long, sides parallel in basal half, then rounded and moderately convergent to apex ; margin barely perceptibly sinuate before the hind angles, the latter right and not rounded at vertex ; disk rather feebly longitudinally impressed, the impression deeper behind ; flattened at sides posteriorly ; surface of head and prothorax densely, finely reticulate punctate. Elytra scarcely one-fifth wider, and a little more than three times as long as the prothorax; sides parallel in rather more than basal half, then gradually narrowed to apex ; surface sparsely finely punctate. Under surface of prothorax more coarsely reticulate than the upper, mesosternum reticulate, abdomen sparsely, finely punctate. Basal joint of hind tarsus subequal in length to the entire remainder; second and third joints each more than twice as long as wide.

Length, 6.5 mm.; width, 2 mm.

Two examples, not differing perceptibly, from Palm Springs, California. Others are in the collection of Dr. Fenyes, from whom I received my specimens. As compared with the present species, *pallidus* is distinctly larger (8 to 9 mm.), of rather stouter form, with the elytra nearly one-half wider than the prothorax, the latter one-half wider than long. The antennæ are shorter and stouter, the fourth joint barely twice as long as wide ; eyes much smaller and scarcely more prominent than the sides of the front ; basal joint of hind tarsus shorter than the remainder, the second and third joints less than twice as long as wide. The elytra are much less shining than in *nitidipennis*, and are apparently entirely devoid of pubescence. One of the two examples of *nitidipennis* is surely a male, but there is no trace of the small brush of hairs near the tip of the penultimate ventral segment mentioned in the description of *pallidus*.

A. gracilis, n. sp.—Rufo-testaceous, very elongate, pubescence excessively short, sparse and indistinct. Head and thorax opaque, elytra moderately shining. Antennæ nearly attaining the middle of the elytra, slender, filiform ; fourth joint about three times as long as wide ; eleventh about three-fourths as long as the tenth, the latter not at all obconical. Eyes very large, separated beneath by a distance which is scarcely equal to the length of the second antennal joint. Prothorax a little transverse, sides straight and parallel in basal three-fourths, just perceptibly sinuate before the hind angles, which are right and sharply defined ; disc not impressed at middle, feebly flattened at sides posteriorly. Elytra fully one-half wider and four times as long as the prothorax ; sculpture of surface nearly as in *nitidipennis*, except that the elytra are more closely punctate, the punctures separated on the average by little more than their own diameters, while in *nitidipennis* they are distant from two to three times their own diameters. Lower surface and legs nearly as in *nitidipennis*.

Length, 7 mm.; width, 2 mm.

Described from a single male specimen taken by Professor Snow in Oak Creek Canon (elevation, 6,000 ft.), Arizona.

The principal differences mentioned above are summarized in the following table :

Eyes small, very slightly more prominent than the sides of the front, separated beneath by a distance which is about three times the length of the second antennal joint ; fourth joint of antennæ barely twice as long as wide *pallidus.*

Eyes much larger ; much more prominent than the sides of the front ; fourth joint of antennæ three to four times as long as wide.

Eyes separated beneath by a distance which is nearly twice the length of the second antennal joint ; tenth joint of antennæ obconical, eleventh not shorter; prothorax narrowed from the middle; elytra not much wider at base than the prothorax, strongly shining *nitidipennis.*

Eyes separated beneath by a distance which is scarcely as great as the length of the second antennal joint; tenth joint parallel, eleventh shorter than the tenth ; elytra much wider than the prothorax at base ; moderately shining *gracilis.*

SYNOPSIS OF BEES OF OREGON, WASHINGTON, BRITISH COLUMBIA AND VANCOUVER.—IV.

BY H. L. VIERECK, ASSISTED BY T. D. A. COCKERELL, E. S. G. TITUS, J. C. CRAWFORD, JR., AND M. H. SWENK.

CERATINIDÆ.

Ceratina, Latr.

Ceratina submaritima, Ckll.—Proc. Acad. Nat. Sci., Phila., p. 352, 1897.

Corvallis, Or., ♀ ♀, 29th May, 4th June, 1897; 24th, 25th May, 7th June, 1898; ♂ ♂, 15th May, 1897; 25th, 27th April, 7th May, 1898; 21st May, 3rd, 9th June, 1899. Elkton, Or., ♀ ♀ and ♂ ♂, 17th January, 1897.

DUFOUREIDÆ.

Halictoides, Nyl.

Halictoides campanulæ, Ckll.—CAN. ENT., XXIX, p. 289, 1897.

Olympia, Wash., 30th June; 24th June, 1895 (T. Kincaid). Visits the flowers of *Campanula scouleri*.

PANURGIDÆ.

Panurginus, Nyl.

Panurginus atriceps (Cress.)—(Calliopsis) Trans. Am. Ent. Soc., VII, p. 67, 1879.

Seattle, Wash., 1st July, 1899; 13th, 20th, 28th May to 2nd June, 1896. ♂, Seattle, Wash., 14th May, at flowers of *Rubus ursinus*.

Perdita, Sm.

Perdita albipennis, Cress.—Trans. Am. Ent. Soc., I, p. 386, 1868.

Wash. Received three, Mr. Lovell.

Prof. Cockerell says that this species follows the sunflower, and that its appearance in Washington is, for this reason, not astonishing.

Calliopsis, Sm.

Face entirely black; abdomen with a spot on each side of the first two segments, a broadly interrupted band on the third, and an almost continuous band on the fourth, white *personatus*.

Face with an almost quadrate yellow mark between the eye and clypeus, this mark with a linear prolongation up along the eye margin to a point on a line with the insertion of the antennæ; first four abdominal segments with transverse bands, which are linear except laterally, where they are broad and sinuate *obscurellus*.

Calliopsis personatus, Ckll.—Proc. Acad. Nat. Sci., Phila., p. 349, 1897. ♀.

Pasco, Wash., May 25, 1896 (T. Kincaid).

Calliopsis obscurellus, Cress.—Trans. Am. Ent. Soc., VII, 201, 1878–1879.

Pasco, Wash., May 25, 1896 (T. Kincaid).

MELECTIDÆ.

Bombomelecta, Patton.

♀

Pygidial area with the sides parallel or nearly, usually elevated along the middle; 12 mm. long or more; abdomen not distinctly spotted, if at all, with pale pubescence on the first segment 1.

1. Dorsulum with a band of black hair extending from one wing to the other.

A spot of white appressed pubescence on each side of abdominal segments 3 and 4.....*separata*, var. *maculata*.

Pubescence of dorsulum concolorous..... 2.

2. Pubescence of dorsulum pale ochreous.....*pacifica*.

Pubescence of dorsulum orange fulvous*fulvida*.

♂

First joint of the flagellum distinctly longer than the second; pubescence from almost white to pale ochraceous and yellow ochraceous..*pacifica*.

Bombomelecta separata, var. *maculata*, Vier.—Trans. Am. Ent. Soc., XXIX, p. 181, ♀, 1903.

Condon, Or., 23rd July, 1899 (Cordley).

B. pacifica, Cress.—Ibid., VII, p. 204, 1879, ♀, not ♂. First described as a variety of *thoracica*.

Vernon, B. C., 24th May, 1903 (Venables), received through Mr. Titus.

B. fulvida, Cress.—Ibid. First described as a variety of *thoracica*.

Vernon, B. C., 3rd May, 1903 (Venables), received through Mr. Titus.

Triepeolus, Robt.

Triepeolus pænepectoralis, Vier, n. sp.

Related to *T. pectoralis*, from which it differs in having the pectus closely coarsely punctured, and in the different coloration.

♀ 9 mm. Head *rather dullish; cheeks, vertex, occiput and front almost uniformly closely rugulosely punctured, the cheeks less coarsely so than the vertex and front*, a distinct keel from a point on a line with the anterior edge of the antennal fossæ to the middle of the front, from there on continued close to the anterior ocellus as a raised line; supraclypeal space and clypeus minutely tessellate, the former with a few indistinct punctures, the latter with sparse, rather distinct punctures; labrum closely rugulose, with two rather distinct, well-separated longitudinal raised lines in the middle of the anterior half; *malar space completely obliterated;* scape as long as the pedicellum and first two joints of the flagellum combined, first joint of the flagellum about two-thirds the length of the second; *middle third of the face transversely covered more or less with whitish appressed pubescence;* upper part of front, vertex and occiput with brownish, more or less erect pubescence, cheeks with inconspicuous appressed whitish and brownish pubescence.

Thorax dullish, almost uniformly closely rugulosely punctured like the cheeks; dorsulum with inconspicuous appressed brownish pubescence, with a short longitudinal stripe of yellowish pubescence on each side of the middle, the edge of the tegulæ and the posterior edge of the dorsulum with a narrow border of yellowish pubescence; prothorax with inconspicuous pubescence except the pronotum, which is covered with yellowish appressed pubescence; scutellum with inconspicuous appressed brownish pubescence, the posterior margin with yellowish appressed pubescence; postscutellum with appressed yellowish pubescence; metanotum rather flat, the funnel shape area smooth and bare, rather shining and impunctate, remainder of the metathorax with brownish appressed pubescence except along the edge of the area, where there is some pale appressed pubescence; mesopleura to a great extent, and sternum, covered with appressed brownish pubescence, the mesopleura with a rather broad band of yellowish appressed pubescence on the anterior edge of the upper half of the sclerite; extending off from this band obliquely downward and backward is a short band nearly as wide as the band from which it springs; wings typical.

Abdomen dorsally nearly as in *pectoralis*, greater part of disc of pygidium covered with stiff brownish hairs; venter of abdomen minutely closely punctured with rather distinct brown appressed pubescence, almost entirely black, or very dark brown, basal joint of flagellum somewhat brownish, the second joint brownish at base.

Type Am. Ent. Soc., Phil.

Type locality, Vancouver I., Canada.

Species of *Triepeolus*, related to *occidentalis*, and represented only by the ♂:

First joint of the flagellum not much more than one-half the length of the second 1.

1. Legs and labrum ferruginous *occidentalis*, var. 1.
 First joint of the flagellum nearly as long as the second 2.
2. Femora, except anterior pair, largely black; anterior femora, all tibiæ and all tarsi ferruginous; labrum reddish *occidentalis*, var. 2 ?

Legs entirely black, excepting the pubescence and the tarsi, the former being white and the latter brownish n. sp.?

Triepeolus occidentalis (Cress.).—Tr. A. E. S., VII, p. 87, 1879, ♀ ♂.

The co-types of this species are from Colorado, and have an almost entirely black labrum.

Var. 1. Oregon. (Received through the courtesy of Mr. J. H. Lovell.)

Triepeolus occidentalis, var. 2 ?

Oregon. (Through Mr. J. H. Lovell.)

Triepeolus, n. sp.?

Vernon, B. C., 12th Aug., 1904 (Harvey).

Epeolus, Latr.

Markings of abdomen white or pale or cream colour; mark on first abdominal segment a transverse band; bands on second to fourth segments interrupted in the middle line; size small; femora black *olympiellus*.

Epeolus olympiellus, Ckll.—Ann. & Mag., N. H., XIII, p. 41, 1904.

Olympia, Wash., 2nd July, 1896 (Kincaid).

Epeolus tristicolor, Vier., n. sp.

Related to *autumnalis*, from which it differs in size, structure and colour.

The italicized characters in *T. pœnepectoralis* occur in this species, and are not here repeated.

♀.—8.5 mm. Frontal keel originating as in *T. pœnepectoralis*, but not extending higher than the middle of the front even as a raised line, and not connected with the anterior ocellus by a shining line; clypeus and supraclypeal space sculptured nearly like the cheeks, somewhat shining; labrum sculptured much like the front, with two short teeth on

the anterior margin, these teeth being about as far apart as the pedicellum is wide ; scape nearly as long as the pedicellum and first two joints of the flagellum combined ; first joint of the flagellum as long as the second; upper part of front, vertex and occiput with less conspicuous whitish pubescence than on the middle third of the face; dorsulum with a more or less distinct margin of appressed dirty white pubescence, somewhat tinted with ochreous, this margin interrupted on the anterior edge of the dorsulum, the interruption as wide as the scape is long ; on each side of the interruption the pubescent margin is prolonged back on the dorsulum at right angles to the anterior margin for a distance somewhat less than the interruption cited above ; pronotum, pleura, except the lower half of the mesopleura, which is nearly bare, posterior margin of scutellum and postscutellum with appressed pubescence similar to that on the dorsulum, but paler, more whitish; the scutellar spines are distinctly shorter than the convexity of the scutellum ; metanotum uniformly dull, with an indistinct median longitudinal rugulose impression ; sternum uniformly pubescent like the superior half of the mesopleura, the pubescence of the sternum almost white.

Abdomen : The pubescence is rather rubbed off, but is nearly as follows : Anterior face of basal segment with appressed pubescence of much the same colour as the pale pubescence on the dorsulum, this pubescent area connected by a broad band of concolorous pubescence, with the apical band occupying the depressed portion of the segment, narrower than the connecting band, but also concolorous, succeeding segments with only the apical band, which is similar to the apical band of the first segment, the penultimate segment almost uniformly covered with appressed pubescence, otherwise the abdomen is clothed with brownish pubescence excepting the lunule and all of the venter but the apical segment ; pygidium rather flat, and with lateral margins.

Almost entirely black ; flagellum brownish, mandibles ferruginous except at extreme base and apex, where they are blackish ; legs blackish, knees, apices of tibiæ and tarsi ferruginous.

Two ♀ ♀. Paratype differs as follows: The frontal keel prolonged as a raised line higher than the middle of the front, and finally connecting with the anterior ocellus by a smooth shining line; the median longitudinal groove on the metanotum is here a distinct shallow channel.

Type Am. Ent. Society, Phila. Two specimens from type locality.

Type locality, Vancouver.

NOMADINÆ.

Gnathias, Robt.

♀

Length over 10 mm.; abdomen dark red; third submarginal cell narrowed almost to a point above; first abdominal segment with a black mark on each side 1.

Length under 10 mm.; third submarginal cell not so much narrowed, except in *Grayi eastonensis* 2.

1. Second segment of abdomen with distinct yellow spots (9th May) *perbella*, Vier, n. sp.

Second segment of abdomen with no yellow spots (28th May) *perbella*, var.

2. Two submarginal cells *Grayi eastonensis*, var.

Three submarginal cells 3.

3. Orbits hardly converging below; third submarginal cell very high and narrrow, but not much narrowed to marginal (Wash) *Washingtoni.*

Orbits conspicuously converging below 4.

4. Abdomen dark red (April) *rhodomelas ?*

Abdomen light red (May) 5.

5. Third submarginal cell narrowed nearly to a point above, broad below (Wash) *Grayi eastonensis.*

Third submarginal cell not thus narrowed above *Grayi*

♂

Scutellum black or red; tegulæ ferruginous; clypeus with only the anterior margin yellow, though often broadly; second submarginal cell receiving the recurrent nervure beyond its middle; abdomen light red, with four large yellow spots; scape black in front; second submarginal cell narrow *rhodomelas.*

Species very like *rhodomelas*, scape almost entirely ferruginous, second submarginal cell broad, as broad at base as high; abdomen dark red; thorax, excepting scutellum, which is red, black: second and third abdominal segments with a conspicuous yellow spot on each side *perbella.*

Gnathias perbella, n. sp.

This is the species mistaken by Prof. Cockerell for a variety of *bella*. It can readily be distinguished by the characters given in the table. This species may prove to be a race of *maculata*. I wish to retract my state-

ment that *bella* is very likely the other sex of *maculata*, since my recent studies in this genus have convinced me that this is hardly possible, owing to the different habitus and entirely different colour of *bella*.

Type Acad. Nat. Sciences, Phila.

Type locality, Corvallis, Oregon.

Corvallis, Or., 9th May, 1898; 28th May, 1899 (Cordley); Hoquiam, Wash., 29th May, 1904, flying (Burke), received through the courtesy of Dr. A. D. Hopkins, Olympia, Wash.; Seattle, Wash., June 25th, 1897 (Kincaid); Glenora, B. C. (Wickham); Vancouver, received through the courtesy of Mr. J. H. Lovell.

Gnathias Grayi, Ckll.—Ann. & Mag., N. H., XII, 203, 1903, ♀.

Corvallis, Or., 7th May, 1898 (Cordley).

Gnathias Grayi eastonensis, Ckll.

Easton, Wash. (K.), from U. S. N. M.

Var. with two submarginal cells. Wash. (A. E. S., Phila.)

Gnathias Washingtoni, Ckll.—Acad. Nat. Sci., Phila., LV, p. 598, 1903, ♀.

Wash. (Am. Ent. Soc., Phila.)

Gnathias rhodomelas, Ckll.—Acad. Nat. Sci., Phila., LV, 598, 1903, ♂.

Corvallis, Or., 20th May, 1899, 15th April, ♀ (Cordley).

There is some doubt whether the ♀ placed here really belongs to *rhodomelas*.

Centrias, Robt.

Hind femora not arcuate; base of abdomen not red; antennæ with a pale annulus; hind femora with much black; no supraclypeal mark *scitiformis.*

Centrias scitiformis, Ckll.—Acad. Nat. Sci., Phila., LV, 591, 1903, ♂

Corvallis, Or., 2nd–8th June (Cordley).

Holonomada, Robt.

(Here belongs *intercepta*. See *Nomada*.)

First joint of the flagellum distinctly longer than the second; only about one-third of the pleura yellow.

Tegument shining; punctures nearly everywhere rather distinctly separated *suavis.*

Tegument dullish; punctures very close, rather rugulose... *vinnula.*

First joint of the flagellum a little longer than the second ; more than one-half of the pleura yellow *Edwardsii.*

Similar to *Edwardsii* in the length of the antennal joints ; only a spot of yellow on the pleura, the spot at the anterior inferior corner ; very like *Hemphilii*, the yellow of the scutellum reduced to two spots ; seventh segment entire *vinnula* ♂.

Holonomada vinnula (Cress.).—Tr. Am. Ent. Soc., VII, 202, 1879, ♂ ♀.

May be only a race of *Edwardsii*, or perhaps only a mutation.

Corvallis, Or., 1–10 June. (Cordley.)

Holonomada Edwardsii (Cress.).—Tr. Am. Ent. Soc., VII, 72, 1879, ♂.

Corvallis, Or., 3rd April, 11th May, June (Cordley). Washington (A. E. S. P.).

Holonomada suavis (Cress.).—Tr. Am. Ent. Soc., VII, 74, 1879, ♀ ♂.

Oregon (A. E. S. P.).

Xanthidium, Robt.

Third joint of the antennæ subequal with the fourth ; posterior orbital margin yellow, mesothorax black, with or without stripes ; face broader than long ; lateral face-mark receding from orbits above ; end of flagellum black above *citrina.*

Lateral face-marks not receding from orbits *civilis.*

Joint three longer than four *Cordleyi.*

Joint three shorter than four 1.

1. Scutellum black *modocorum.*

Scutellum red *libatum.*

Scutellum yellow or spotted with yellow 2.

2. Basal nervure meeting the transverse medial nervure 3.

Basal nervure ending distinctly basad of the transverse medial nervure. 4.

4. Legs yellow and black, sometimes with a red suffusion, especially toward the base ; apex of abdomen notched, though sometimes obscurely ; legs with red if any 5.

5. Pleura with a large transverse yellow patch 6.

Pleura with a smaller yellow mark below tubercles 7.

6. The yellow patch not divided in the middle ; scutellum with two yellow spots ; mesothorax all black *rivale.*

7. Lateral face-marks continued narrowly to top of eye ; flagellum not denticulate ; tibiæ yellow, with a black spot behind *civile.*

A separate genus may have to be erected for the reception of *Cordleyi.*

Xanthidium? Cordleyi, Ckll.—Ann. & Mag., N. H., XII, 445, 1903, ♂.

Corvallis, Or., 3rd June, 1899. (Cordley.)

Xanthidium citrinum (Cress.).—Tr. Am. Ent. Soc., VII, p. 79, 1879, ♀.

Wash. (A. E. S. P.).

Xanthidium civile (Cress.).—Tr. Am. Ent. Soc., VII, p. 78, 1879, ♂.

Corvallis, Or., 3rd June, 1899. (Cordley.)

Xanthidium modocorum, Ckll.—Ann. & Mag., N. H., XII, p. 445, 1903, ♂.

Corvallis, Or., June. (Cordley.)

Xanthidium libatum (Cress.).—Tr. Am. Ent. Soc., VII, 80, 1879, ♀ ♂.

Oregon. (Through Mr. Lovell.) ♂ differs from Colorado co-types as follows: Metathorax with a median black line as wide as the flagellum; abdominal bands yellowish-white.

Xanthidium rivale (Cress.).—Tr. Am. Ent. Soc., VII, 79, 1879, ♂.

Wash. (Am. Ent. Soc., Phila.)

Nomada, Fabr.; *Holonomada*, Robt. (*intercepta*), and *Nomadula*, Ckll. *(erytrochroa).*

Abdomen with black bands (June).....*nigrocincta*, Sm.

Abdomen with a black band at apex of first abdominal segment.....*Cressoni Trevoriana*, Ckll., n. subsp.

Abdomen without black bands.....1.

1. Abdomen with yellow spots on the second and third abdominal segments; more or less of a band on the fourth, etc.; third antennal joint about equal with the fourth; a little yellow at lower corners of face. (May and June).....2.

Abdomen without yellow spots or with small spots.....3.

2. Thorax almost entirely ferruginous.....*Lewisii.*

Thorax almost entirely black, including scutellum...*gibbosa*, Vier., n.sp.

Thorax almost entirely black; scutellum ferruginous; abdomen immaculate beneath.....*vicinalis infrarubens*, Ckll., n. subsp.

3. Abdomen without yellow spots.....4.

Abdomen with yellow spots (4 or 6), yellow at lower corners of face; third antennal joint longer than the fourth.....6.

4. About 10 mm. long.....5.

About 8 mm. long.....7.

5. Third antennal joint almost as long as fourth ; no yellow at corners of face ; sides of abdomen with suffused black marks. (April). *Clarkii.*
Third antennal joint distinctly shorter than the fourth ; no yellow at corners of face ; sides of abdomen without black.... *Kincaidiana.*

6. Base of abdomen with a black mark in middle, or with black right across.
Third antennal joint not much shorter than fourth. (May, June)..... *Oregonica.*
Third antennal joint distinctly shorter than the fourth. *Hoodiana.*
Base of abdomen without a black mark in the middle ; third antennal joint much shorter than the fourth. (May, June)..... *ultima.*

7. Yellow at lower corners of face.
Third antennal joint not more than one-half the length of the fourth ; sides of abdomen inclined to be black spotted. (May, June)..... *Astori.*
Third antennal joint nearly as long as fourth ; sides of abdomen not at all black spotted..... *Fowleri.*
No yellow at lower corners of face.
Third antennal joint at least as long as fourth ; abdomen dark red, its sides without black marks. (May)..... *Corvallisensis.*
Third joint distinctly shorter than fourth, but more than half as long..... *erythrochroa.*

Nomada nigrocincta, Sm., new spec.—Hym. Brit. Mus., 99, ♂.
Corvallis, Or., 3rd June, 1899. (Cordley.)

Nomada Cressoni Trevoriana, Ckll., n. subsp.
No subdiscal cuneate spot on fourth abdominal segment.
Olympia, Wash., 22nd April, 1894. (T. Kincaid.)

Nomada Lewisii, Ckll.—Ann. & Mag., N. H., XII, 205, 1903.
Corvallis, Or., 7th May, 5th June. (Cordley.)

Nomada gibbosa, Vier., n. sp
Type Acad. Nat. Sci., Phila. Type locality, Oregon.
Received through the courtesy of Mr. J. H. Lovell.

Nomada vicinalis infrarubens, Ckll.—Bull. 94, Colo. Expt. Sta., p. 84.

Labrum very hairy ; ends of linear upward prolongation of lateral face-marks slightly bending from orbits ; flagellum bright red, the last joint pointed, the first five joints black above ; hair of upper part of thorax (especially scutellum) strongly brownish ; tubercles reddish, with a

yellow spot; tegulæ, scutellum, two stripes on mesothorax, and a small mark on lower part of pleura, in front, red; first abdominal segment with basal half black, with two red marks; yellow bands on segments one to five, broadly interrupted by red in the middle; sixth segment with a short bilobed yellow band; apical plate very hairy. The antennæ remind one of *N. Pascoensis*, but the insect is otherwise very different.

Type Acad. Nat. Sci., Phila., Pa. Type locality, Corvallis, Oregon. June, 1899. (Cordley.)

Nomada Clarkii, Ckll.—Ibid, 203, ♀.

Corvallis, Or., 6th April. (Cordley.)

Nomada Kincaidiana, Ckll.—Acad. Nat. Sci., Phila., LV, 614, 1903, ♀.

Wash. (Am. Ent. Soc., Phila.)

Nomada Oregonica, Ckll.—Ann. & Mag., N. H., XII, 205, 1903, ♀ ♂.

Corvallis, Or., ♀, 21st May to 7th June; ♂, 27th April. (Cordley.)

Nomada Hoodiana, Ckll.—Acad. Nat. Sci., Phila., LV, p. 608, 1903, ♀.

Mt. Hood, Or. (Am. Ent. Soc., Phila.)

Nomada ultima, Ckll.—Ibid, 206, ♀.

Corvallis, Or., May to 7th June. (Cordley.)

Nomada Astori, Ckll.—Ibid, 206, ♀.

Corvallis, Or., ♀, June; var. a, 20th May. (Cordley.)

Nomada Fowleri, Ckll.—Ibid, 204, ♀.

Corvallis, Or., 15th April, 1897.

Nomada Corvallisensis, Ckll.—Ibid, 207, ♀.

Corvallis, Or., 24th May. (Cordley.)

Nomadula erythrochroa, Ckll.—Ibid, 203, ♀. Belongs to *Centrias* according to Robertson.

Pasco, Wash, 25th May, 1896. (T. Kincaid.)

Nomada intercepta, Sm., n. sp.—Hym. Brit. Mus., 100, ♂, is a *Holonomada*, Vanc.

Prof. Cockerell examined the type, with the following results: "Pleura black, with a large yellow mark in front. Head very hairy, supraclypeal area with a yellow spot, and metathorax with a yellow mark on each side. Apical plate of abdomen narrow, broadly rounded, entire. Third antennal joint longer than fourth. Basal nervure passing a little basad of transverse medial."

(To be continued.)

THE RED-HEADED ORCHELIMUM AND SOME OTHER NEW JERSEY ORTHOPTERA.

BY WM. T. DAVIS, NEW BRIGHTON, STATEN ISLAND, N. Y.

It seems quite certain in considering Redtenbacher's description of *Xiphidium agile*, DeGeer, which he considers the same as *Orchelimum vulgare*, Harris, that he took for his type of the species what is generally identified as *O. vulgare*. His figure (80) is also a typical *vulgare*. He says the elytra not at all or scarcely exceeding the hind femora, very little shorter than or equalling the wings. All the femora unarmed. These are characters of *O. vulgare*, Harris.

DeGeer's figure, however, shows a rather slender insect, in which the wings are longer than the elytra, and he says the wing-covers are transparent. Such an insect, with the hind femora spined on the under side, occurs in New Jersey, and has been identified by Prof. Lawrence Bruner as *Orchelimum agile*, DeGeer. I am indebted to Prof. J. B. Smith for specimens of this species, which agree very well with DeGeer's description and figure. They show no dark median streak down the face. In the Pine Barrens of New Jersey there is another *Orchelimum* much resembling *vulgare*, but which may easily be told from it at a distance by its very different song. Upon a nearer approach its most noticeable feature is its very red face, often the whole head being of a blood-red colour. It appears as if the insect had eaten of ripe cranberries and got its head stained with the fruit, for the colour is the same. The Red-headed *Orchelimum* appears to be undescribed, and may be more particularly characterized as follows:

Orchelimum erythrocephalum, sp nov.—A medium-sized robust species, with the general colour green; there are occasional light brown examples. The face, if not wholly red, has usually a red band down the middle, which expands laterally. This area is not definite, and not chocolate brown as in some other species. There is a dark brown dorsal band upon the prothorax and head. The elytra and wings usually exceed the hind femora about 4 mm, and the wings are usually a little longer than the elytra. The hind femora are rarely without erect spines, but are armed with from one to several spines on the under side. The spines are on the outer carina, and are not always of the same number on both legs. The ovipositor is curved, but less so than in *Orchelimum vulgare*.

Measurements: Male—Length of body, 20 mm.; of pronotum, 5 mm.; of tegmina, 20 to 24 mm.; of hind femora, 16 mm. Female—Length of body, 21 mm.; of pronotum, 6 mm.; of tegmina, 21 mm.; of hind femora, 17 mm.; of ovipositor, 9 mm.

A number of males and one female have been collected at Lakehurst, N. J., where it is far more common than *vulgare*. I have also collected the species at Tom's River, N. J. One female, from Ocean Co., N. J., was received from Prof. J. B. Smith.

In September, 1903, three male specimens of a large Conocephalus were collected at Lakehurst, N. J. I was first attracted to the spot in the abandoned cranberry bog by hearing the insect stridulate. The song was a slow *zip-zip-zip*, repeated many times, and much resembling the stridulation of *Conocephalus exiliscanorus*, of the salt meadows. However, when the first specimen was captured its resemblance to *C. robustus* was noted, and those to whom the specimens have been shown have suggested that it was *robustus*. The song, however, is very different, the fastigium is shorter, and bordered with a narrow black line on the lower surface extending from the tip to base, or nearly so. This species, which seems to be new, I take pleasure in naming after Mr. Andrew N. Caudell, to whom I am indebted for making comparisons with specimens in the National Museum.

Conocephalus Caudellianus, sp. nov.—A robust species, either green or brown, the brown specimens having the tegmina flecked with black. Fastigium obtuse, its sides with a faint yellow line, beneath which there is a black line extending from the apex to the base of the antennæ, or nearly so. The lower basal tooth blunt but distinct. Anterior and middle femora unarmed beneath; posterior femora armed beneath on both carinæ with numerous spines

Measurements: Male—Length of body, 33 mm.; of fastigium beyond the eyes, 2.5 mm.; of pronotum, 8 mm.; of tegmina, 44 mm.; of hind femora, 24 mm.

Another interesting insect from Lakehurst, N. J., is what Mr. Caudell assures me is *Conocephalus Nebrascensis*, Bruner, a species usually reported from the upper Mississippi Valley and further west. Eleven specimens were collected in various cranberry bogs on the 20th of September, 1903, and many others were heard.

TWO NEW HOMOPTERA OF THE FAMILY CHERMIDÆ, ONE OF ECONOMIC IMPORTANCE.

BY G. W. KIRKALDY, HONOLULU, HAWAIIAN ISLANDS.

Fam. Chermidæ. (= Psyllidæ of some authors.)

Trioza Koebelei, sp. n. (Fig. 14).—The figures of the tegminal neuration and of the male genital segment in profile, and the following brief description, will distinguish this destructive form from the three other North American Trioza species. Head and thorax varying from dark fulvous to blackish, polished, shining. Antennæ testaceous, except apically. Tegmina and wings hyaline, colourless, nervures brownish. Femora dark fulvous or blackish-brown, tibiæ and tarsi testaceous, except the apices of the apical tarsal segments. Abdomen smooth, polished and shining, black, with a dark bluish-green gloss.

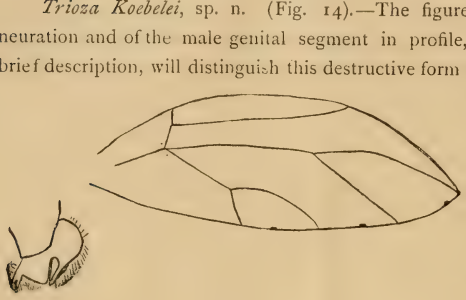


Fig. 14.

Head and eyes wider than thorax; dorsum medio-longitudinally sulcate transversely, about as wide as the eyes, which are a little longer than broad (as seen dorsally) well rounded, and substylate. Frontal cones small, but well developed. Antennæ longer than head, pronotum and dorsulum together nearly, or quite, as long as posterior tibiæ, third segment very long. Dorsulum suboval. Anterior femora dilated.

♂.—Abdomen elongate; genital segment (fig. 14) pale fulvous.

♀.—Abdomen laterally angulate so that it is roughly diamond-shaped. Genital segments reddish-brown.

Length to apex of abdomen a little under 3 mm.; length to apex of tegmina in repose, about 6 mm.

Habitat: Mexico, Morelos (Koebele); forms large light brown coloured galls on leaves of *Persea gratissima* ("Alligator Pear") and is very destructive. The galls are ovoid, with truncate base, and are placed erect (usually) on the upper surface of the leaf. Height, about 6 mm.

CALLISTOCHERMES, gen. nov.

Belongs to that section of *Aphalarinæ*, F. Low, which James Edwards apparently includes in Cherminæ (= Psyllinæ), characterized by the frontal cones being well developed ; the cubital petiole is about as long as the basal part of the subcostal nervure. The form of the dorsulum and mesonotum recalls the Triozinæ rather than either the Cherminæ or Aphalarinæ.

Head strongly declivous ; dorsum strongly transversely impressed, about three times as wide as long, lateral margins diverging slightly anteriorly, posterior margin slightly angularly emarginate. The eyes are attached to the side of the head, and appear suboblique, postero-laterally they are on a level with the very short transverse, linear pronotum. Vertex and frons longitudinally sulculate very distinctly ; frons very transverse, with an apical ocellus. Cones bullet-shaped, as seen anteriorly; from beneath they are seen to be narrow at their base and obliquely elongate, contiguous apically. The other ocelli are on the posterior margin of the vertex, subcontiguous to the eyes, which are prominent, transverse, substylate, together almost as wide as the vertex. Head and eyes much wider than thorax. Dorsulum* octohedral, somewhat convex and declivous, much longer than the pronotum ; mesonotum convex, a trifle longer than the dorsulum. Tegmina elongate, apically rounded, costa arched. Basal part of subcosta curved, about equal in length to petiole of cubitus, much longer than the part of the subcosta between basal part and radial forking. Stigma short, subtriangular. All the nervures more or less sinuate or curved.

C. rubrovariegata, sp. n.—Anterior half of vertex crimson, freckled with pale greenish and dark brown ; posterior half of vertex, the pronotum and dorsulum dark greenish-brown, freckled with crimson and whitish. Frons pale greenish-white, cones obscure greenish. Eyes grayish-green. Ocelli red. Antennæ pale greenish-yellow, tip of each segment blackish-brown. Mesonotum pale greenish-white, freckled with black, with a linear median and broad lateral pale crimson bands longitudinally. Scutellum pale greenish, with a medio-longitudinal stripe, which at its middle has a very short line at right angles on each side. Abdominal tergites dark greenish-brown, posterior margin narrowly crimson. Tegmina subhyaline, colourless, freckled all over with blackish-

*There is an unfortunate printer's error in Froggatt's paper in Proc. Linn. Soc. N. S. W., 1900, Pl. XIII., f. 2 ; 4 a should be mesonotum and 3 a dorsulum.

brown, especially apical third and the costa, a large blackish-brown transverse spot commencing just apical to the stigma, which lengthens on the next area and then splits into two, which continue separately to the interior margin, thus forming two narrow, transverse blackish-brown bands, uniting a little above the middle of the tegmen. Veins on apical half of tegmina, crimson. Wings hyaline, veins grayish-brown. Underside bright green, tarsi and tibiæ more or less reddish.

Length of body, 4 mm.; length to apex of closed tegmina, 6¼ mm.

Habitat: Queensland, Brisbane (July, 1904, R. C. L. Perkins), on grasses in a mangrove swamp.

This is the most ornate Chermid yet described.

DR. HOLLAND'S MOTH BOOK.

The following corrections in the genus *Catocala* in Dr. Holland's Moth Book" should be made:

Plate XXXI.—Fig. 4, is a well marked form of *C. agrippina* and not var. *subviridis*. Fig. 8, is *C. luctuosa* and not *retecta*. Fig. 11, is *C. Angusi*, var. *lucetta*, and not *C. flebilis*. Fig. 14, is *C. obscura*, var. *residua*, and not *C. obscura*.

Plate XXXII.—Fig. 5, is *C. flebilis* and not *C. carolina*, subsp. nov. Fig. 6, is *C. relicta*, var. *clara*, and not *C. relicta*. Fig. 7, is *C. relicta* and not var. *bianca*.

Plate XXXIII.—Fig. 1. This poor figure looks like a very pale example of *C. irene* and is not *C. Californica*. Fig. 4, is *C. ultronia*, var. *adriana*, and not var. *celia*. Fig. 6, may possibly be *C. Meskei*, but the species is not recognizable from the figure. Fig. 7, is one of the many varieties of *C. ultronia* and not var. *mopsa*. Fig. 8, looks like *C. Californica* and is not var. *augusta*.

Plate XXXIV.—Fig. 7, looks like *C. ilia* and is not var. *osculata*, which has clear yellow hind wings.

Plate XXXV.—Fig. 7, is *C. gracilis*, var. *sordida*, and not *C. praeclara*. Fig. 1, is *C. sancta* and not *C. amasia*. Fig. 2, is *C. similis*, var. *aholah*, and not *C. similis*. Fig. 3, is *C. similis* and not var. *aholah*. Fig. 5, looks like *C. blandula* and is not *C. fratercula*, var. *jaquenetta*. Fig. 13, is *C. mariana* and not *C. Stretchii*. Fig. 14, looks like *C. Californica* and is not var. *cleopatra*. Fig. 15, looks like *C. Californica*, var. *cleopatra*, and is not *C. rosalinda*, which is a straight synonym of *C. Meskei*.

WM. BEUTENMULLER, New York.

MANITOBA MICRO-LEPIDOPTERA.

BY W. D. KEARFOTT, MONTCLAIR, N. J.

(Continued from page 256.)

PYRALIDINA.

Diastictis argyralis, Hbn.—Beulah, IX, 14.

Nomophila noctuella, Schiff.—Cartwright.

Loxostege chortalis, Grt.—Aweme, VI, 6, to VI, 19; Souris.

Loxostege sticticalis, Linn.—Aweme, VII, 1; Souris; Wattsview.

Diasemia plumbosignalis, Fern.—Aweme, VII, 21 to 27; Cartwright.

Perispasta cæculalis, Zell.—Cartwright; Aweme, VI, 16 to 25.

Phlyctænia ferrugalis, Hbn.—Cartwright.

Phlyctænia itysalis, Walk.—Cartwright, VII, 18.

Phlyctænia tertialis, Gn.—Aweme, VI, 9 to 25; Cartwright.

Pyrausta fodinalis, Led.—Aweme, VII, 7 to 28; Souris.

Pyrausta unifascialis, Pack.—Beulah, VII, 15.

Pyrausta submedialis, Grt.—Rounthwaite, July.

Pyrausta perrubralis, Pack.—Aweme, VII, 28 and 29; Beulah, VII, 15; Rounthwaite, July.

Pyrausta ochosalis, Dyar.—Aweme, VI, 16, to VII, 2; Beulah; Cartwright, VI, 9.

Pyrausta signatalis, Walk.—Rounthwaite, June.

Pyrausta nicalis, Grt.—Aweme, VI, 13, to VIII, 15; Cartwright, VIII, 12.

Nymphula allionealis, Walk.—Rounthwaite, July.

Nymphula maculalis, Clem.—Cartwright.

Nymphula badiusalis, Walk.—Cartwright.

Schœnobius sordidillus, Zinck.—Rounthwaite, July.

Schœnobius unipunctellus, Rob.—Cartwright.

Schœnobius mellinellus, Clem., and var. *albicostellus*, Fern.—Cartwright, VII, 6.

Schœnobius Clemensellus, Rob.—Cartwright.

Crambus perlellus, Scop.—Cartwright.

Crambus pascuellus, Linn.—Rounthwaite, June.

Crambus coloradellus, Fern.—Aweme, VII, 22; Beulah, VII, 15.

Crambus murellus, Dyar.—Rounthwaite, July.

Crambus mutabilis, Clem.—Cartwright.

Crambus caliginosellus, Clem.—Cartwright.

Crambus luteolellus, Clem.—Beulah, VIII, 15.

Crambus præfectellus, Zinck.—Cartwright.

Crambus trisectus, Walk.—Beulah, VIII, 15.

Thaumatopsis nortella, Kearf.—Rounthwaite, June.

Chilo comptulatalis, Hulst.—Cartwright; Rounthwaite, July.

Diatræa idalis, Fern.—Cartwright.

Argyria auratella, Clem.—Aweme, VII, 31.

Tioga aplastella, Hulst.—Aweme, VI, 31.

Wanda baptisiella, Fern.—Rounthwaite, July.

Myelois obnupsella, Hulst.—Aweme, VI, 10.

Myelois corniella, Rag.—Aweme, VIII, 14 and 16.

Acrobasis caryæ, Grt.—Cartwright.

Mineola tricolorella, Grt.—Cartwright.

Ambesa lætella, Grt.—Cartwright.

Meroptera pravella, Grt.—Cartwright.

Salebria basilaris, Zell.—Rounthwaite, July; Aweme, VI, 16 and 18.

Salebria carneella, Hulst.—Aweme, VI, 16 and 18.

Myrlæa delassalis, Hulst.—Cartwright, VII, 10.

Laodamia fusca, Haw.—Aweme, VII, 22; Rounthwaite, June.

Epischnia albiplagiatella, Pack.—Beulah, VII, 14.

Epischnia Boisduvaliella, Gn.—Beulah, VIII, 15.

Megasis atrella, Hulst.—Cartwright; Rounthwaite, May.

Sarata perfuscalis, Hulst.—Beulah, V, 18.

Hulstia undulatella, Clem.—Rounthwaite, July; Cartwright, VIII, 13.

Homœosoma uncanale, Hulst.—Aweme, VI, 29; Cartwright.

Peoria approximella, Walk.—Aweme, VI, 16, to VI, 23; Beulah, VII, 15, to VIII, 15; Rounthwaite, July.

Oxyptilus tenuidactylus, Fitch.—Rounthwaite, July.

Platyptilia cosmodactyla, Hbn.—Rounthwaite, May.

Platyptilia percnodactyla, Wlsm.—Aweme, X, 2.

Platyptilia albidorsella, Wlsm.—Rounthwaite, May.

Platyptilia petrodactyla, Walk.—Rounthwaite, July.

Alucita Belfragei, Fish.—Rounthwaite, July.

Alucita cinerascens, Wlsm.—Rounthwaite, July.

Pterophorus homodactylus, Walk.—Rounthwaite, July.

Pterophorus Brucei, Fern.—Aweme, VI, 16, to VIII, 4; Beulah, VII, 15, to VIII, 15.

Pterophorus sulphureodactylus, Pack.—Rounthwaite, July.

Pterophorus paleaceus, Zell.—Aweme, VI, 28.

Pterophorus Baroni, Fish.—Rounthwaite, July; Aweme, VIII, 3.

Orneodes hexadactyla, Linn.—Aweme, V, 29.

TINEINA.

Harpipteryx canariella, Wlsm.—Rounthwaite, July; Cartwright; Aweme, VII, 31.

Harpipteryx frustella, Wlsm.—Rounthwaite, July; Cartwright.

Trachoma instabilella, Wlsm.—Rounthwaite, April.

Plutella maculipennis, Curt.—Rounthwaite, Sept.; Aweme, V, 25–28.

Telphusa quinquecristatella, Cham.—Aweme, VI, 6.

Aristotelia fungivorella, Clem.—Rounthwaite, July.

Recurvaria quercivorella, Cham.—Aweme, IV, 21, to V, 31.

Recurvaria obliquestrigella, Cham.—Aweme, V, 1 to 28.

Gnorimoschema gallæasteriella, Kell.—Rounthwaite, July; Beulah, VIII, 15; Aweme, X, 23.

Aproærema nigratomella, Clem.—Aweme, VI, 25.

Anacampsis tristrigella, Wlsm.—Rounthwaite, Aug.

Anacampsis niveopulvella, Cham.—Aweme, VII, 23 to 31.

Gelechia lugubrella, Fabr.—Aweme, VI, 7 to 14, VII, 31.

Gelechia dentella, Busck.—Aweme, VI, 6 to 25.

Gelechia grisella, Cham.—Aweme, IV, 18–V, 1–VI, 8–VII, 31 and X, 22. Agrees with Chambers' brief description, *Ante* IV, 171, 1872. Mr. Busck, in his revision of the Gelechiid family, places this species among those of which the types are missing, and no authentic examples are in existence. The specimens agree exactly in venation and structure with Busck's definition of the genus *Gelechia*. The species should follow *discoocellella*, Chamb., in the list.

Gelechia variabilis, Busck.—Rounthwaite, July; Beulah, VIII, 15.

Gelechia ornatifimbriella, Clem.—Rounthwaite, July; Aweme, VI, 16, to VII, 9.

Gelechia nigrimaculella, Busck.—Rounthwaite, Aug.; Aweme, VI, 6 to 16.

Gelechia pseudoacaciella, Cham.—Beulah.

Gelechia mediofuscella, Clem.—Aweme, IV, 8, to VI, 8.

Trichotaphe flavocostella, Clem.—Cartwright.

Trichotaphe purpureofusca, Wlsm.—Rounthwaite, July.

Trichotaphe setosella, Clem.—Rounthwaite, Aug.; Aweme, VI, 8.

Ypsolophus ligulellus, Hbn.—Rounthwaite, Sept.; Aweme, V, 23 to VI, 3, and X, 13.

Depressaria arnicella, Wlsm.—Cartwright; Aweme, IV, 24.

Depressaria argillacea, Wlsm.—Aweme, IV, 14, to V, 2.

Depressaria novimundi, Wlsm.—Aweme, VI, 27.

Depressaria psoraliella, Wlsm.—Rounthwaite, Aug.

Depressaria sabulella, Wlsm.—Beulah, VI, 15.

Depressaria Canadensis, Busck.—Rounthwaite, Aug.; Cartwright, IV, 11 to 17, and X, 11.

Semioscopsis aurorella, Dyar.—Aweme, IV, 16. One specimen identical with "Topotype" from Mr. Merrick.

Semioscopsis Merriccella, Dyar.—Aweme, V, 2 to 16. Two specimens very close to Dyar's type.

Semioscopsis inornata, Wlsm.—Rounthwaite, April; Cartwright.

Ethmia fuscipedella, Wlsm.—Rounthwaite, June; Cartwright.

Borkhausenia pseudospretella, Staint.—Aweme, V, 16 to 31; Cartwright, X, 30; Beulah.

Holcocera modestella, Clem.—Rounthwaite, July; Aweme, VI, 16 to 25.

Scythris impositella, Zell.—Rounthwaite, July.

Walshia amorphella, Clem.—Rounthwaite, July; Beulah, VII, 15.

Gracilaria elongella, Linn.—Aweme, V, 10 to 15.

Gracilaria stigmatella, Fabr.—Aweme, V, 27; Cartwright, XI, 1.

Argyresthia andereggiella, Dup.—Rounthwaite, July; Aweme, VII, 31.

Tineola bisselliella, Hum.—Aweme, IV, 19.

Monopis biflavimaculella, Clem.—Rounthwaite, Aug.; Cartwright; Aweme, V, 29, to VI, 16.

Monopis monachella, Hbn.—Cartwright; Aweme, VI, 16.

Amydrya effrenatella, Clem.—Cartwright.

Adela purpura, Walk.—Aweme, IV, 25, to V, 20.

I have between thirty and forty additional species of *Tineina*, which I hope to be able to work up and record in a supplementary article early next year. Owing to space limitations, it has been thought best to publish the new species of the *Tortricidæ* in the proceedings of the U. S. Natl. Museum. Due notice will be given when this appears, so that copies may readily be obtained by any one interested, either from the Museum direct or from me.

BEETLES FROM NORTHERN BRITISH COLUMBIA.

BY J. H. KEEN, METLAKATLA, B. C.

About ten years ago (see CAN. ENT., Vol. XXVII, Nos. 7 and 8) I published a list of beetles taken by me on the Queen Charlotte Islands. The beetles enumerated below were, except where otherwise designated, taken on the mainland of British Columbia, on the coast between the mouths of the Naas and Skeena Rivers. Some of them were determined for me through the kindness of Dr. James Fletcher, the Dominion Entomologist, whose valuable help and advice I have now for many years enjoyed; the remainder by Professor H. F. Wickham, of Iowa University, to whose skill and courtesy I am deeply indebted.

CARABIDÆ.

Elaphrus pallipes, *Horn.*
Bembidium breve, *Mann.*
" quadrifoveolatum, *Mann.*
Bembidium cautum, *Lec.*
" iridescens, *Lec.*
Harpalus innocuus, *Lec.*

AMPHIZOIDÆ.

Amphizoa insolens, *Lec.*

DYTISCIDÆ.

Hydroporus vilis, *Lec.*
Ilybius quadrimaculatus, *Lec.*
Agabus anthracinus, *Mann ?*
Rhantus divisus, *Aube.*
Colymbetes strigatus, *Lec.*

GYRINIDÆ.

Gyrinus minutus, *Fab.*

HYDROPHILIDÆ.

Ochthebius Holmbergi, *Makl.*
Philhydrus conjunctus, *Fall.*
Creniphilus subcupreus, Say.

STAPHYLINIDÆ.

Thinopinus pictus, *Lec.*
Tachinus debilis, *Horn.*
Homalium segmentarium, *Fauvel*, n. sp.*
Massetia tetramera, *Fauvel*, n. sp.*
Orobanus rufipes, *Casey.*
Eunonia Keeniana, *Casey.*
Trigonurus Crotchii, *Lec.*

PSELAPHIDÆ.

Actium testaceum, *Casey.*

*From Queen Charlotte Islands, B. C.

CRYPTOPHAGIDÆ.

Atomaria, *near* fallax, *Casey.*
Atomaria, *near* oblongula, *Casey.*

LATHRIDIIDÆ.

Melanophthalma gibbosa, *Hbst.*
Lathridius lardarius, *DeGeer.**

DERODONTIDÆ.

Derodontus trisignatus, *Mann.*

PARNIDÆ.

Elmis concolor, *Lec.*

DASCYLLIDÆ.

Cyphon concinnus, *Lec.*
Cyphon variabilis, *Thunb.*

ELATERIDÆ.

Elater apicatus, *Say.*
Athous scissus, *Lec.*
Agriotes fucosus, *Lec.*
Corymbites sagitticollis, *Esch.?*

LAMPYRIDÆ.

Ellychnia Californica, *Mots.*

CLERIDÆ.

Laricobius, *near* Erichsonii, *Rosenh.*

PTINIDÆ.

Ptinus, sp.

CICIDÆ.

Xestocis biarmata, *Mann.*

SCARABAEIDÆ.

Aphodius congregatus, *Mann.*

CERAMBYCIDÆ.

Criocephalus asperatus, *Lec.*
Ulochætes leoninus, *Lec.*

CHRYSOMELIDÆ.

Donacia emarginata, *Kirby.*
Chrysomela multipunctata, *Say.*
Syneta hamata, *Horn.*
Galerucella nymphææ, *Linn.*
" albida, *Lec.*

PYTHIDÆ.

Boros unicolor, *Say.*

ŒDEMERIDÆ.

Ditylus cæruleus, *Rand.*

CEPHALOIDÆ.

Cephaloon tenuicorne, *Lec.*

*From Queen Charlotte Islands, B. C.

SOME MAINE SPECIES OF HALICTUS.

BY JOHN H. LOVELL, WALDOBORO, MAINE.

This paper continues the enumeration of the species of Halictus found in Maine, begun in the CANADIAN ENTOMOLOGIST for February, 1905, page 40.

Halictus similis, Smith, ♀ ♂.—A very common species in this locality, taken from June 19th to August 24th. It visits a great variety of flowers, as the blackberry, Iris versicolor, Sagittaria latifolia, Aralia hispida, Cornus Canadensis, and the thistles and goldenrods. Professor Cockerell, who has examined Smith's type in the British Museum, states that the Maine specimens agree with it in all the more important characters. It is a broad, thickset bee, with the mesothorax closely punctured; the metathorax is sharply truncate, with the basal area not well defined, and coarsely sculptured or ridged; the first segment of the abdomen is distinctly punctured, and there are lateral fasciæ, sometimes entire, on the second and third segments. It differs from Smith's type in the lighter brown colour of the stigma; and the apical fimbria, which, in the type light fulvous, is brown in the Maine form.

Halictus pectoralis, Smith, ♀ ♂.—Collected on the blackberry, rose, goldenrod, etc. The specimens are typical, not very common.

Halictus Foxii, Robt., ♀ ♂.—Taken on Diervilla trifida and the wild rose. Agrees with authentic material of *H. Foxii* in the produced clypeus, absence of hair patches at base of abdominal segments, and in the sculpturing of the metathoracic area. The differences are slight.

Halictus divergens, n. sp., ♀.—This species is very closely allied to *H. quadrimaculatus*, Robt.; but the head in that species is nearly round viewed from in front, while in *H. divergens* it is decidedly longer than broad; the wings are darker and the nervures a dark brown. Length, 6 mm. In other characters it agrees with *H. quadrimaculatus*; the mesothorax is finely punctured; the metathorax is rounded, with numerous raised lines not extending to the apex; and at the extreme sides of abdominal segments 2 and 3 there are patches of white pubescence.

Halictus nelumbonis, Robt., ♀.—I have taken this species only on the flowers of Nymphæa (Nuphar) advena, not common. It agrees with the description, and was also a few years ago determined for me by Dr. Ashmead.

Halictus pilosus, Smith, ♀ ♂.—A common species. Collected on the flowers of Salix Bebbiana, Clematis Virginiana, and Epilobium angustifolium.

Halictus viridatus, n. sp., ♀.—Length, 5–6 mm. Head and thorax green, abdomen black, with apical margins of the segments testaceous. Head broad, length and width about equal; face finely and densely punctured, clypeus purple, with few rather coarse punctures; mandibles dark at base, with apices rufous; antennæ black, testaceous behind. Mesothorax with punctuation sparse and fine, nearly bare, the pubescence short and thin; metathorax rounded, the disc coarsely sculptured, the raised lines prominent, rather far apart and reaching to the apex. Wings yellowish hyaline, the stigma and nervures yellowish brown, the tegulæ testaceous. Abdomen impunctate, first and second segments smooth and shining, apical segments with thin appressed pale pubescence.

♂.—Length a little over 5 mm., more slender than the female. The sides and lower half of face clothed with dense whitish pubescence, apex of clypeus, labrum, and tips of mandibles yellow; antennæ with flagellum testaceous behind, long, reaching beyond the tegulæ, joint 4 as long as 2 + 3; disc of metathorax coarsely rugose; apical margins of abdominal segments testaceous; tarsi and tibiæ, except an oblong spot along the centre, yellow.

The female is distinguished by the broad head, the coarsely rugose area of the metathorax, and the robust form. Collected on the cultivated blackberry and rhubarb in June; the males were taken in August on Solidago. Mr. Henry L. Viereck has compared specimens of this species with various types in the collection of the Academy of Natural Sciences at Philadelphia. Professor Cockerell writes: "It is not a Smithian species; I do not know of any to which it is even closely allied."

Halictus planatus, n. sp., ♀.—Length, 6 mm. Head and thorax green, abdomen black, pubescence sparse, whitish. Head nearly round, slightly longer than broad, face very finely and closely punctured above the insertion of the antennæ, below the punctures are fewer and coarser; antennæ black, flagellum testaceous behind. Mesothorax with very fine, rather remote punctures; metathorax narrowly truncate, disc with few fine raised lines at the sides, in the centre nearly smooth except for a median line. Wings hyaline, slightly darkened, stigma and nervures pale brown, tegulæ brown-black. Abdomen impunctate, apical segments clothed with a thin whitish pubescence, margins not testaceous, or very narrowly so.

Collected on willows, May 6–12, and on Aralia trifolia, May 21–23. It differs from *H. viridatus* in having the area of the metathorax much smoother, the abdomen blacker, less convex, and the head and thorax have a more bluish tinge.

NEW SPECIES OF COLLETES.

BY MYRON H. SWENK, UNIVERSITY OF NEBRASKA, LINCOLN.

Colletes Vierecki, n. sp.— ♀ . Length, 11–12 mm. Shining black, form stout, body almost bare. Clypeus slightly convex, not sulcate, closely striato-punctate, sparsely clothed with short, pale pubescence. Supraclypeal area convex, shining and impunctate medially, and with crowded punctures on the margins. Face crowded with good sized punctures, and with very short, erect, pale pubescence. Antennæ black, the flagellum more or less dull brownish beneath, the scape deeply punctured, joint 3 a shade shorter than 4, decidedly shorter than 5 and the following, which are shorter than wide. Malar space practically lacking, at most a mere line. Mandibles rufous beyond middle, tip very acute, notch large and nearly one-fourth its length from tip. Labrum shining, concave, a large, round, median excavation bounded on each side by a subtriangular one, which occupies most of the remaining space, and is indistinctly crossed by some weak ridges. Cheeks rather coarsely and closely punctured except around the orbits, their pubescence very sparse and whitish. Vertex shining and polished, anteriorly depressed by elongated foveæ, finely and sparsely double punctured, its pubescence fairly long, pale and black intermixed, the former predominating posteriorly, the latter between ocelli.

Prothoracic spine distinct, sharp, broadly subtriangular. Pubescence of a broad anterior thoracic border, mostly grayish-white, and very short and thin, dense on a grayish mat on tubercles; that on entire disc mostly black, of very scattered, short, bristle-like hairs not nearly concealing the surface ; a black scutellar fringe followed by a pale one, and longer pale grayish hairs on postscutellum and down the sides of metathorax. Mesothorax anteriorly with a median impressed line and coarse, very close punctures, becoming more separated posteriorly, decidedly more so on a very small disc. Scutellum shining, very coarsely and quite closely studded with round punctures, postscutellum with fine cancellate punctures. Pleura with very large, coarse, striate punctures. Superior face of metathorax well defined by a rimmed angulation, and with the usual shining pits square medially, enclosure polished, approaching the T shape because of the very wide base and narrow bowl, the former of these convex with lateral ridges, and the latter with indistinct transverse rugæ, the surrounding areas shiny, sparsely punctured and irregularly feebly

reticulated. Tegulæ shining deep black. Wings deeply infuscated except at base, where they are subhyaline, nervures black, stigma dark brown.

Legs stout, black, with apex of claw joint and claws ferruginous, the latter medially toothed, their pubescence longest on posterior femora and tibiæ, wholly grayish white except for the ferruginous tufts on the inner tarsal apices. Anterior coxæ with small short spines, tibial spurs dusky testaceous, at most but very finely pectinate. Abdomen stout, subconical, the first segment polished, its basal truncation impunctate, elsewhere with rather fine but distinct and very well separated punctures, becoming very fine and close on apical margins, following segments less polished but still shiny, more finely and closely punctured, apex finely rugose. Apical margins of segments 1 and 2 constricted and depressed, of 3 and 4 merely depressed. Segments 1–5 have narrow white fasciæ continued on the ventral fringes, but otherwise the abdomen is almost bare, having but short scattered hairs at base and down sides of first segment, the other segments with minute scattered pale pubescence and some longer black hairs on three apical segments.

Types: Four ♀ specimens, Anglesea, New Jersey, August 8th, 1901, on "white umbellifer" (H. L. Viereck). Collection Acad. Nat. Sci., Philadelphia.

I take pleasure in dedicating this fine species to its discoverer, Mr. Viereck, to whom I am indebted for many favours. In its bare appearance it resembles *C. nudus*, Rob., but is easily separated by lacking the postscutellar pits. Its size, dark thoracic hairs, dark wings and peculiar abdominal punctation easily separate it from any other North American species.

Colletes intermixtus, n. sp.— ♀. Length, 9½ mm. Black. Clypeus flat, shiny, medially slightly but broadly sulcate, apex transverse, its punctures coarse but widely separated, and not forming distinct striæ, laterally with sparse pale pubescence. Supraclypeal area shining and impunctate, except for a very few marginal punctures. Face closely punctured, clothed with short gray pubescence. Sides of vertex shining, minutely sparsely punctured. Antennæ black, the flagellum brownish fuscous beneath beyond second joint, which is just a shade shorter than first, all the median joints shorter than wide. Labrum convex, shining, medially with a long linear depression. Malar space very short, linear, finely striate. Mandibles dark, tips rounded, tooth prominent and near tip.

Cheeks shiny, finely sparsely punctured, clothed with long sparse white pubescence. Vertex with long sparse hairs, pale and black intermixed, occiput with a short, dense pale fringe.

Prothoracic spine present, short and sharp. Mesothorax with small, round, deep punctures, crowded but distinct anteriorly, along sides and posteriorly well separated, a very few on a good-sized shining disc. Pleura similarly but striately punctured. Scutellum with anterior one-third shining and impunctate, the remainder coarsely, sparsely punctured, and with a median depressed line. Postscutellum densely punctured. Superior face of metathorax fairly well defined, its pits shining, somewhat irregular, longer than broad. Enclosure perfectly funnel-shaped, shining, the bowl convex, with a median and several lateral ridges, the neck concave and perfectly smooth. Surrounding areas shiny, with sparse but very distinct punctures. Pubescence of thorax white, tinged with gray above and sparingly mixed with black on mesothorax and scutellar fringe. Tegulæ black, edged with testaceous. Wings subhyaline, nervures dark brown, stigma paler.

Legs stout, black except for apical tarsal joints, which are brownish, clothed with short, dense, white pubescence, that fringing anterior borders of intermediate and posterior tarsi short, stiff and black, that on under surface of posterior femora and tibiæ largely black. Basal joint of hind tarsus three times as long as broad, and hind tibiæ very stout. Tibial spurs short, dark testaceous, not distinctly pectinate. Claws ferruginous, medially toothed. Anterior coxæ with very short blunt spines. Abdomen stout, distinctly subconical, shining black, first segment subimpunctate, or at most indistinctly and scatteringly punctured, second and following segments indistinctly but rather closely punctured, the apical margins perfectly smooth and impunctate under the fasciæ, which are broad and pure white on segments 1–5. Basal segment with long, erect, white hairs on the basal truncation, becoming shorter, sparser and subdepressed on the convexity, and forming a short, dense fringe down the sides, uniting with the apical fascia. The following segments have short scattered pale hairs, becoming longer, denser and more bristly in a fringe just before the fasciæ, and also intermixed with similar dark ones on the last three segments, especially the apex. Ventral segment 5 deeply emarginate on apical margin. Apical margin of first two segments and base of second segment depressed and constricted.

Type: Fedor, Lee County, Texas, April 22nd, 1904 (G. Birkmann), one ♀ specimen. Collection University of Nebraska.

This species is very distinct in its subimpunctate basal abdominal segment, and sparsely punctured clypeus, from all the other species with black thoracic hairs.

Colletes tegularis, n. sp.— ♀. Length, 11 mm. Allied to *C. armatus*, but differing in the following well marked characteristics: Black hairs on dorsum very few and scattered, confined to the disc, and a fringe of longer ones placed in a spaced row around posterior border of scutellum; pubescence of vertex and both anterior (broadly) and lateral (narrowly) borders of mesothorax pale grayish ochraceous, the vertex with a very few, scattered, short and inconspicuous dark brown to black hairs laterally; pubescence of whole face whitish, long and silvery on the cheeks; mat on tubercles tinged with ochraceous; head and thorax, especially the former, somewhat smoother and more shiny; prothoracic spine rather shorter and stouter; tegulæ pale testaceous; wings clear, nervures and stigma dusky ferruginous.

Types: Two ♀ specimens, Gering, Scott's Bluff County, Nebraska, August 14, 1901, on *Solidago* (M. A. Carriker, Jr.). Collection University of Nebraska.

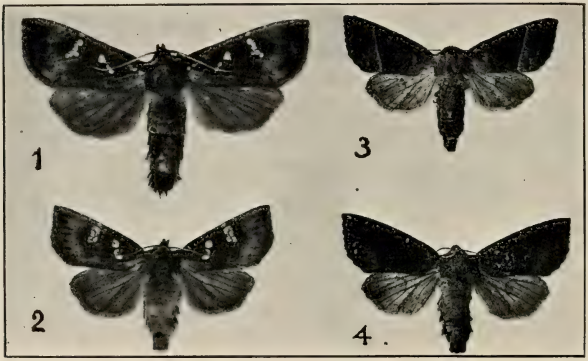
This species is closely related to *C. angelicus*, Ckll., but is easily separated by its paler pubescence.

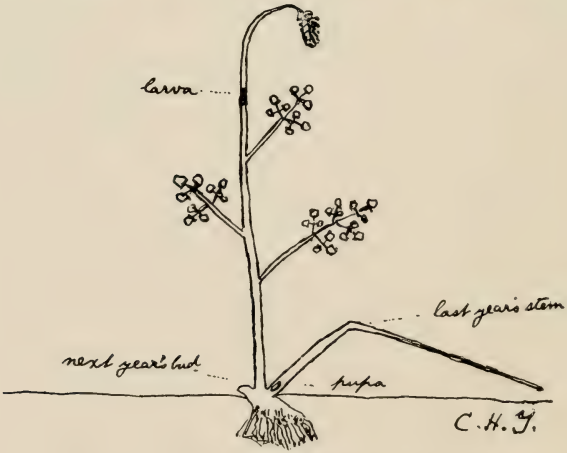
The Forty-second Annual Meeting of the Entomological Society of Ontario will be held, by kind invitation of President Creelman, at the Ontario Agricultural College, Guelph, on Wednesday and Thursday, October 18th and 19th.

In reply to numerous enquiries, we beg to say that the Annual Report of our Society for 1904 was presented to the Legislature of Ontario at the beginning of last session, and for some months has been in the hands of the King's Printer in Toronto. Eight weeks ago the galley proofs were corrected, but the completion of the work is still most unaccountably delayed.

Genera Insectorum.—We are informed by M. P. Wytsman, the publisher (43 Rue St. Alphonse, Brussels, Belgium), that most of the parts of this work are sold separately, and that a price-list will be furnished on application.

Mailed July 31st, 1905.





5. METHOD OF ATTACK OF THE MEADOW RUE BORER.

NEW GORTYNAS.

The Canadian Entomologist.

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NEW GORTYNAS.

BY HENRY H. LYMAN, M. A., MONTREAL.

The forms treated of in this paper would naturally fall in the group for which Dr. J. B. Smith proposed the name Papaipema,* and which Dr. Dyar in his catalogue accepted as a generic name, but as it was not so intended by the proposer, I do not know that it is necessary to accept it as such.

In 1902, while paying a brief visit to the White Mountains, from 6th to 10th August, I noticed that the plants of the Tall Meadow Rue (*Thalictrum Cornuti*, L.), growing by the side of the road which runs from Fabyan's to the base of Mt. Washington, gave evidence of having been attacked by some borer. I slit a number of the stems, but in every case the borer had gone down into the root. I therefore set to work to get up some of the roots, but as I had neglected to bring a trowel or spud, and had only a large jackknife, and as the rootlets were very fibrous and matted, the task was very laborious. With considerable difficulty I succeeded in getting up three roots, with which I contented myself, thinking that as the plant was so common the species boring in it must be almost as common, as almost every plant examined had been attacked.

One of the larvæ was injured in getting up the roots, but the two others seemed all right, and were carried home to Montreal, but one died almost immediately afterwards. These larvæ were white, with hardly any colour, and quite unlike any Gortyna larva which I had previously seen, so that I doubted their belonging to that genus. The one surviving larva duly pupated, and the moth emerged on 12th Sept. It was a ♀, and slightly deformed, but seemed to be distinct from anything that I had previously seen, but on showing it to Mr. Bird, of Rye, when on a visit to New York, he pronounced it to be undoubtedly a dwarf and slightly deformed specimen of *Cerussata*, and as he had frequently bred the latter, I accepted his dictum.

In 1903 several of the members of our Montreal Branch looked for it in this locality, and had no difficulty in finding it, almost every Meadow Rue plant seeming to be attacked. Moths were reared by Messrs. D. and

*Trans. Amer. Ent. Soc., XXVI, 2.

H. Brainerd, Winn, Norris, and the writer, the first named in some numbers, among which appeared an interesting variety in which the white markings were obsolete, but I secured only one, which was of the normal type.

This same species was found by Dr. Fletcher and Mr. Young at Ottawa in 1902 and 1903, the latter observer also breeding the unmarked variety, and these various breedings were duly recorded under the name *Cerussata* in Dr. Fletcher's valuable "Record" in the Annual Reports of the Ent. Soc. Ont. for 1902 and 1903.

In spite, however, of Mr. Bird's opinion, I had my doubts as to the status of the Meadow Rue form, and determined to clear the matter up if possible in 1904, Mr. Bird very kindly presenting me with an inflated larva of *Cerussata* for comparison. Search was accordingly made in company with Mr. Norris on 17th July, when ten Meadow Rue Borers were secured by me, some through the generosity of my companion.

These proved to be the most easily reared larvæ in this genus that I have ever had, one larva only dying a natural death, though one was kindly turned into an inflate for me by Mr. Arthur Gibson.

The root seemed to keep in good condition a long time, and did not have to be changed. The one that died was the last, and by that time the root had become a little mouldy, which probably accounted for the fatality. They were slow about pupating, but seemed quite happy in their burrows; they ate comparatively little, and the frass was in very minute grains like sand. They closed the openings to their burrows with a plug of silk and frass, and if I took this away to ascertain how they were getting on, and if pupation had taken place, it was renewed as soon as possible. On account of this secretive habit I failed to obtain exact data as to the length of the pupal period. These larvæ were at once seen to differ very markedly from the inflated specimen of *Cerussata* given me by Mr. Bird, but as I was anxious to compare the living larvæ, I appealed to that gentleman for larvæ of *Cerussata*, and he very kindly sent me four. I thus found that the species were absolutely distinct; indeed, the larva of the Meadow Rue Borer is much more like that of *Macronoctua Onusta* than that of *Cerussata*. Indeed, so like the former is it that Mr. Gibson, who had bred that species from the roots of Iris at Ottawa, at first thought it was the same. On account of what Mr. Gibson wrote, I went out with Mr. Norris on the 31st July to look for the larva of *Onusta* in the roots of Iris, and succeeded in finding three.

On comparing these at home with the larvæ of the Meadow Rue Borer, I found that while they resembled each other very closely, they were still easily distinguished by the following points :

In the Meadow Rue Borer the cervical shield is brown, though lighter than the head, while in *Onusta* it is almost of the same colour as the body. The anal plate is smaller than in *Onusta*, and is brown, while in *Onusta* it is pale yellowish. The warts are also more prominent in the Rue Borer, especially on the 8th abdominal segment.

As this species is unquestionably distinct from *Cerussata*, I describe it as follows, naming it after its food-plant :

Gortyna Thalictri, n. sp.—(The Meadow Rue Borer.)

Alar expanse, 34–40 mm. Very similar to *Cerussata*, but less brightly coloured. It is also a smaller species, and though size does not count for much in this group, there being dwarfs and giants in all the species, the average size is of some assistance in separating the forms. Primaries of a warm brown, with a slight purplish tinge within the t. a. line and beyond the t. p. line, or what Dr. Strecker designated the basal and limbal areas. Markings similar to those of *Cerussata*, but the t. a. line is generally a little more distinct, from the fact that the yellowish costal mark where it starts is generally better defined, and the line is more bordered with yellowish. The orbicular is rounder than in *Cerussata*, and generally has a brown spot in it towards the apex of the wing, which frequently reaches the edge, and so gives the spot the shape of a round-ended crescent.

The t. a. and t. p. lines are as nearly as possible alike in both species, but the median shade, which, however, varies considerably as to position in both species, in generally nearer the t. p. line in *Thalictri* than in *Cerussata*.

In *Cerussata* there is generally a bright, almost red, patch in the central area of the primaries extending forward from the inner margin to about half way between veins 1b and 1c of the diagram on page 16 of Dr. Holland's Moth Book, which *Thalictri* does not have, though occasionally that portion of the wing is a little brighter in colour than the rest.

But the chief distinction between the moths is in the reniform, which in *Cerussata* is, as stated by Grote,* slightly oblique, the angles which it

*This species is erroneously attributed by Dyar to Grote and Robinson, and in this error is followed by Smith in his check List of 1903, though correctly referred by him in his first check List of 1891.

makes with the costa not being equal, but slightly obtuse inwardly and slightly acute outwardly, and it also curves a little outwardly, and if produced would strike the outer margin about 1/6th of the distance between the apex and inner angle forward of the latter point, while in *Thalictri* it is almost invariably exactly at right angles with the costa, is generally broader in proportion to length, and if produced would exactly strike the inner angle.

In Grote's description of *Cerussata* there appears to be a curious error, as in describing the t. p. line he says "regularly dentate between the veins," while the teeth which point outwards are on the veins and the lunules in the interspaces. The apical patch is generally a little brighter in *Cerussata* than in *Thalictri*, and the subterminal line differs slightly in the two forms, but from its general obscurity and some tendency to variation, it is not easy to define the slight differences.

Secondaries: In *Thalictri* the tendency is to a more dusky hue, though some specimens of *Cerussata* are as dark, and there is frequently a well-marked exterior line as in Holland's Fig. 15 in *Thalictri*, but there is great variation in this as well as in the depth of the shade.

Below the wings are smoky, the primaries darker, with a well-marked median line crossing both wings, the course of it on the fore wings differing slightly from that in *Cerussata*, as it runs straighter towards the apex, and then turns rather sharply towards the costa. Discal marks generally present on all wings. In other points not differing noticeably from *Cerussata*.

Had we only the moths, however, I should not have ventured to describe the species, but the great difference in the larvæ renders the distinctness of these species absolutely certain. The larva of *Cerussata* has been well described by Bird, CAN. ENT., XXXII, 232, and the following is a description of that of *Thalictri*, taken 11th Sept, 1904:

Length in motion 15 lines, at rest 14 lines. Head rather small, smooth and shining, chestnut brown, mouth-parts darker, cervical shield as wide as head, covering most of 1st thoracic segment, slightly yellower brown than the head, narrowly edged at sides with darker brown. Body cream colour, with a transverse pinkish shade in the centre of each segment. No longitudinal stripes. Warts small to minute and inconspicuous. Anal plate small, almost smooth, shining, same colour as cervical shield, slightly edged above with darker brown. The two rear warts on the upper part of the anal segment are slightly united into a

small transverse plate, quite distinct, however, from the anal plate, instead of being united with it as in *Cerussata*. On the 8th abdominal segment tubercles I and II are practically round and quite distinct, forming a square, while in *Cerussata* they are greatly enlarged and practically united into a conspicuous quadrate patch. In *Cerussata* also Mr. Bird has pointed out that tubercle IV on the 7th abdominal segment is raised a little above the line of the spiracles, a feature which he says holds with all that are strictly root borers, but does not hold in *Thalictri*, in which it is placed below the line of spiracles.

Pupa: Length, 17–23 mm.; diam., 4–6 mm.; dark chestnut brown, but brighter and smoother than in *Cerussata*, cremaster with two short curved diverging spines.

I have already mentioned that in 1903 Mr. D. Brainerd secured specimens in which the white spots were entirely wanting, the spots being brown, of a deeper shade than the rest of the wing. This form was also reared in the same year at Ottawa by Mr. C. H. Young, and last year out of eight specimens reared by me two were of this form, which bears the same relation to the typical form as *Nitela*, Gn., does to *Nebris*, Gn., except that there are fewer of them in proportion. As this variety is so well marked, and as there do not appear to be any intergrades, it is well worthy of a name, and I therefore propose for it the name of Var. *Perobsoleta*, which was kindly suggested to me by Dr. Dyar. The dates of emergence of my specimens ranged from 9th to 26th Sept., the two extreme dates being the dates of emergence of the two specimens of Var. *Perobsoleta*. The moths emerged at different times, but two whose time of emergence was carefully noted emerged between 11 and 12 p.m. Seventeen specimens (7 ♂, 10 ♀) of the typical form and 5 specimens (1 ♂, 4 ♀) of the variety are before me.

Of *Thalictri*, Types No. 1–8 are in my collection; Type No. 9 has been deposited in the National Museum at Washington under No. 8468, the gift of Mr. D. Brainerd; Types 10–12 are in the collection of the Entomological Society of Ontario, at London, Ont., the gift of Mr. Young; Types 13 and 14 are in Mr. Young's collection; and Nos. 15, 16 and 17 are in the collections respectively of Messrs. Brainerd, Winn and Norris. Of Var. *Perobsoleta*, Types 1 and 2 are in my collection; Type 3 has been deposited in the National Museum at Washington under No. 8469, also the gift of Mr. D. Brainerd: Type 4 is in Mr. Brainerd's collection, and Type 5 in that of Mr. C. H. Young.

Mr. Young has kindly sent me a drawing illustrating his observations on the habits of the larva and the following notes:

"The young larvæ were first observed on the 11th May, and at that time they were thin and of a dark reddish-brown colour, and measured about half an inch in length. At this date the tips of the infested plants were bent downwards, and looked as if they had been injured by frost. In every instance the larva was found about 6 or 8 inches below the bend, having eaten its way down inside the stem. About the middle of June larvæ were found much further down the stem, about 3 or 4 inches from the ground, and soon after this date they reach the main root of the plant, where the larvæ feed until maturity. When mature the larva leaves its burrow and enters the previous year's stem, where it changes to a pupa. By the 27th July the larvæ under observation were full-grown, and shortly afterwards pupated. Pupæ were found from about the end of July, all through August, and in every case the pupæ were found inside the old stem of the plant."

In my rearing operations I had the larvæ in their roots singly in jelly tumblers, and in every case they pupated in their burrows, without leaving them or looking for any other refuge, but possibly this was because there was no other place where they could go.

Mr. Norris has examined many plants, but has never found any early drooping of the plant, but has seen this later in the season when the larva had been boring some time in the root.

In the White Mountains it was the drooping of the top of the plant which attracted my attention, but that was at the beginning of August, and the larvæ were mature.

Mr. Winn failed in 1903 and 1904 to find any young larvæ of this species in the Meadow Rue plants examined early in June, but this year, on the 18th June, he found four larvæ about 5/8 inch long in the roots, and also several of larger size in the stems.

Mr. Winn informs me that since his attention was directed to this species he has not found an old Meadow Rue plant at Montreal, Biddeford, Me., or among the Laurentian Mountains that was not tenanted by one of these larvæ, and is of the opinion that the insect is of benefit to the plant in ridding it of excess of root-stock.

In 1903 Mr. Herbert Brainerd sent from Brownsburg, Q., to his brother, Mr. Dwight Brainerd, in Montreal, a number of larvæ which he

had found boring in various plants, and among them one from the Joe-Pye or Trumpet weed (*Eupatorium Purpureum*, L.).

When the moth emerged it was seen to be something quite different from anything known to our members. Mr. Brainerd lent it to me to show to Mr. Bird when I visited New York in January, 1904, but that gentleman did not care to assume the responsibility of describing it before he had an opportunity of seeing the types of *G. Nelita*, Streck.

On my trips to Montreal West in July, 1904, search was made for borers in the *Eupatorium*, which grows in great profusion in that locality, and some success achieved, though only a very small percentage of the plants were found to be attacked, which is not surprising considering their extreme abundance, and the attacked plants were difficult to detect, partly because the plant sometimes has a habit of growing with its head bent over, and apparently slightly drooping, and also because it is so very vigorous that it will stand a good deal of boring before showing its effects. About half a dozen, however, were secured, some of which were kindly given me by Mr. Norris. The larvæ were not closely examined, as they were supposed to be of only one species, and I was more concerned to secure imagoes to see if they would prove the same as Mr. Brainerd's specimen than to make critical studies on the preparatory stages. These larvæ proved rather difficult to rear, as the food-plant tends to dry out even when kept in tin-topped jelly jars, and I succeeded in bringing only three to imago, two of which proved to be identical with the form reared by Mr. Brainerd, except that they are not quite so strongly marked, are a shade lighter in colour, and are smaller, while the third proved to be a small example of *G. Cataphracta*, which was not previously known to occur in this locality. On my visit to New York in January last I again took Mr. Brainerd's specimen with me, and went out to New Brunswick to show it to Dr. J. B. Smith, and to see such of his types in this group as are preserved in the Rutger's College Collection, and as he admitted that he had never seen anything like it, and agreed that *Nelita*, Streck., was the same as the form I named *Ærata*, I had no hesitation in concluding that we have in it an undescribed species, and as Mr. Brainerd did not care to describe it himself, he has permitted me to incorporate the description in this paper.

Gortyna Eupatorii, n. sp.—(The Trumpet Weed Borer.)

Primaries dark brown, with a slight sprinkling of gray. The most conspicuous mark is the t. p. line, which is double, runs outwardly oblique to the subcostal nervure, then turns at a right angle and runs almost absolutely straight and parallel with the apical half of the outer margin to the inner margin. In Type No. 1 this line is as straight as if ruled with a ruler, but in the two specimens reared by me it is not quite so sharply defined. This line is bordered outwardly with ash-gray, with a grayish atmosphere extending outward to the submarginal line, which is irregularly waved and edged outwardly with creamy scales. The other markings are somewhat obscure, but the upper part of the basal line, the t. a. line, orbicular, median shade and reniform show as slightly darker markings on the ground colour. Fringes dark brown, with a few creamy specks.

Secondaries paler brown, with an obscure discal mark and veins slightly darker, fringes concolorous.

Head and thorax brown, heavily sprinkled, especially the latter, with ash-gray, dorsal tuft transverse, adze-shaped, erect.

Collar edged with ash-gray.

Antennæ grayish brown.

Beneath paler than above, but primaries darker than secondaries, with a dark median line on both wings, discal spots fairly defined, especially on secondaries. Primaries have a whitish, fairly straight submarginal line. Legs grayish brown.

Alar expanse, 34–39 mm.

Length of body, 17–18 mm.

Types: No. 1, ♀, reared by Mr. D. Brainerd, and in his collection; No. 2, ♂, and No. 3, ♀, reared by myself, and preserved in my collection.

Explanation of Plate VII.

I am indebted to Mr. Norris for taking the photographs of the moths from which the half-tone was made.

No. 1 is a typical specimen of G. Cerussata, and may be compared with Grote's figure, Proc. Ent. Soc, Phil., II, Pl. IX, Fig. I.

No. 2.—Gortyna Thalictri, Lyman.

No. 3.—Gortyna Eupatorii, Lyman.

No. 4.—Gortyna Thalictri, var. Perobsoleta, Lyman.

No. 5 is a reproduction of the drawing made by Mr. Young to illustrate his notes on the larval habits.

SYNOPSIS OF BEES OF OREGON, WASHINGTON, BRITISH COLUMBIA AND VANCOUVER.—IV.

BY H. L. VIERECK, ASSISTED BY T. D. A. COCKERELL, E. S. G. TITUS, J. C. CRAWFORD, JR., AND M. H. SWENK.

(Continued from page 287).*

ANTHOPHORIDÆ.

Anthophora, Latr., and *Emphoropsis*, Ashm.

Clothed with cinereous pubescence, which on the dorsulum, face, second, third, fourth and fifth abdominal segments is thinly mixed with black; posterior tibiæ and metatarsi, the latter largely, covered with whitish hairs; metatarsus with a broad brush of brown hairs on the apical margin; length about 15 mm *ignava.*

Similar to *ignava* in size and pubescence, but the posterior tibiæ and tarsi with bright fulvous pubescence *Emphoropsis cineraria.*

Pubescence of face and vertex mixed with black; pubescence of thorax and of the first abdominal segment very bright orange fulvous, not at all mixed with black; hair on lower part of pleura black *Emphoropsis floridana Pascoensis.*

Face, dorsulum anteriorly and base of abdomen with ochraceous pubescence.

Second and third segments of the abdomen with fulvous pubescence *insularis.*

Second and third segments of the abdomen with ochreous and black pubescence respectively, the first and second segments alone being covered with pale hair *Stanfordiana.*

Abdomen almost entirely black, only the apex of venter with pale hair *Solitaria.*

Anthophora Washingtoni, Ckll., n. sp.

"♀.—Length about 14 mm.; nearly agreeing with the description of *A. Edwardsii*, Cresson, but conspicuously differing" by the white hair-bands on the hind margins of the abdominal segment; weak or rudimentary on the first, but very strong, white and entire, though rather narrow, on segments 2 to 4 (Mr. Vincent writes me that in *Edwardsii* "the hair bands are practically wanting"). "The pubescence is grayish-white, with a strong admixture of black on the vertex and dorsum of thorax; the third,

*The following correction should be made in the preceding part of this paper: Page 287, line 9 from bottom, for "*Nomada intercepta*, Sm., n. sp.—Hym. Brit. Mus.," read "*Nomada intercepta*, Sm.—New Spec. Hym. Brit. Mus."

fourth and fifth abdominal segments also have black hair on the disc ; the basal joints of the tarsi are reddish-brown in the middle beneath, coarsely fringed with black hair. The eyes are light yellowish-green. The appearance of the bee is strongly suggestive of *A. urbana*, but it is a larger insect, the abdominal bands are narrower, and without any yellowish tint ; the first abdominal segment is much less hairy, the tibial spurs are darker, and the third antennal joint is very long, I think quite twice as long as in *urbana*, obviously longer than the scape. Six from Pasco, Wash., May 25, 1896 (Kincaid)."

Type coll. T. D. A. Cockerell.

(This species is more like *ignava* than *Edwardsii*, but in *ignava* the abdominal bands are rather indistinct and incomplete.—H. L. V.)

Anthophora ignava, Cress.—Trans. Am. Ent. Soc., VII. 210, 1879, ♂ ♀.

Corvallis, Or., ♀ ♀, 15th May, 1899 ; 16th May, 1896 ; 8th June (Cordley). In these specimens the hairs of the dorsal aspect are hardly tinted with ochreous as in the type, and the white hairs on dorsum of abdomen are much more abundant. Beside the four co-types from Nevada, there are only two other specimens in the collection of the Am. Ent. Soc., and these are labelled Calif. and S. Calif. The specimen from S. Calif. is more like the Oregon examples than any of the others.

Anthophora Stanfordiana, Ckll.—Ent. News, XV, 32, 1894.

Corvallis, Or., ♀ 11th, March, 1899; ♂, 12th June, 1898; 21st May, 1899 (Cordley). Differs from the description of the types in having the pale pubescence ochreous instead of whitish. In the ♀ the pale pubescence on the second segment is inconspicuous, and on the third segment pale pubescence is entirely absent.

Anthophora solitaria, Ckll.

" *insularis*, Sm.—New Spec. Hym., Brit. Mus., 124, ♀.

Vanc. Not seen.

Emphoropsis cineraria, (Sm.).—Ibid, ♀ ♂.

Described as an *Anthophora*.

Vanc. Not seen.

Emphoropsis floridana Pascoensis, Ckll.—Proc. Acad. Nat. Sci., Phila., p. 54, 1898.

Pasco, Wash.

Clisodon, Patt.

♂

Structure like in *terminalis*, and like that species easily distinguished by the bidentate apex of mandibles and the deeply emarginate apical abdominal segment; differs from *terminalis* in having the pubescence of the dorsal segments 4–5 and 6 black, and in the legs which are almost entirely covered with black pubescence *syringæ*.

Clisodon Syringæ (Ckll.).

Podalirius syringæ, Ckll.—Proc. Acad. Nat. Sci., Phila., p. 54, 1898, ♂.

Olympia, Wash., 3rd July, 27th June, at flowers of *Syringa* (T. Kincaid).

Synhalonia, Patt.

♀

[For *nigricornis*, Prov., and *lata*, Prov., see *Melissodes*.]

The second, third and fourth abdominal segments with distinct fasciæ. 1.
The second, third and fourth abdominal segments with indistinct fasciæ, only the fourth segment with an entire fascia *Edwardsii*.

1. Apex of abdomen with fuscous pubescence 2.
2. Pubescence cinereous, mandibles entirely black *Fowleri*.
 Pubescence largely ochreous, mandibles with a pale brownish mark *Cordleyi*.

♂

Sixth ventral segment with two stout teeth *actuosa*.
Sixth ventral segment without teeth 1.

1. Abdomen not uniformly pubescent; beyond the first two segments the abdomen is nearly bare; apical third of venter with some dark or black hairs *Edwardsii*.
 Abdomen uniformly pubescent; venter with pubescence all pale *Cordleyi*.

Synhalonia Edwardsii (Cress.) *(Melissodes)*.—Proc. Acad. Nat. Sci., 195, 1878, ♂, redescribed as *S. Edwardsii angustior*, Ckll., ibid, 347, 1897, ♀ ♂.

This species, according to Prof. Cockerell, occurs in numbers at Olympia, Wash. Pasco, Wash., 5 ♂, 2 ♀, 25th May, 1896 (T. Kincaid). Corvallis, Or, ♀ ♀, 1st June, 1897; 5th, 6th, 26th May, 4th, 7th, 9th June, 6th July, 1896; 19th, 21st May, 2nd, 11th June, 1899; ♂ ♂, 13th May, 1896; 29th May, 1897; 9th 10th, 13th, 28th May, 1898; 7th, 8th June, 1898 (Cordley). Vernon, B. C., 24th May, 1903.

Prof. Cockerell's characterization of this form is quoted to aid in identifying the species.

"(b). Race *angustior*, ♂.—Face conspicuously longer than broad; sides of clypeal yellow above, squarely notched, distance between the yellow and eyes extremely small, pubescence somewhat paler. ♀ smaller, with pale pubescence, abdomen with the white bands on the fourth and fifth (instead of third and fourth) segments, that on the fifth fuscous in the middle, but brilliant white at the sides. Wings clearer."

Synhalonia Edwardsii, var. *latior*, Ckll., ibid, 347, ♂.

Olympia, Wash., ♂ ♂, 24th April, 2nd, 10th, 11th, 17th, 21st, 23rd, 25th May, 5th June; ♀ ♀, 1st, 5th, 11th, 18th, 19th, 21st, 24th, 25th, 29th June, 4th July. Seattle, Wash., ♂ ♂, 17th April, 3rd May; ♀ ♀, 19th May (Kincaid). Two specimens from Olympia on *Lupinus*. Corvallis, Or., ♂ ♂, 8th May, 1898; 15th, 21st, 28th May, 2nd June, 1899 (Cordley).

Prof. Cockerell designated this as a race, but since it is found in the same locality with the typical form it can rank only as a variety or form. The description is as follows:

"(a). Race *latior*, ♂.—Facial quadrangle not far from square; sides of the clypeal yellow, gradually sloping above, distance between the yellow and the eyes quite considerable."

Synhalonia Fowleri, Ckll.

Synhalonia Californica, Fowler.—Can. Ent., XXXI., p. 137, 1899, ♀, not Cresson.

Corvallis, Or., 1st May, 1899 (Cordley).

Synhalonia Cordleyi, Vier., n. sp.

♀ 14 mm. Head dullish, sculpture of the face, cheeks and occipul nearly or entirely hidden by rather long pale ochraceous pubescence; greater part of head finely roughened; clypeus with coarse shallow adjoining punctures; labrum apparently rugulose, the sculpture obscured by pubescence, the ocelli forming a low triangle nearly on the supraorbitat line (*i. e.*, an imaginary line connecting the upper posterior margin of the eyes), the posterior ocelli as far from each other as the lateral ocellus is from the nearest eye margin; first joint of the flagellum a trifle shorter than the next two joints together, apical joint of antennæ as broad throughout as the preceding joint, the apex obliquely flattened beneath; mandibles slightly emarginate at tip, the emargination making two very short subequal teeth, the outermost tooth being longest.

Thorax dull, all but the postscutellum and metanotum covered with dense pubescence, that on the dorsum bright ochreous, on the pleura pale ochreous, almost whitish, dorsulum covered with shallow almost adjoining punctures; pleura finely sculptured or roughened; postscutellum rugulose; enclosure of metanotum finely granular excepting in the posterior lateral corners, where some rather coarse rugæ and impressions are visible; a fine median raised line bisects the enclosure; wings in structure and colour typical, *i. e.*, nearly exactly as in *Edwardsii*; legs with various shades of brownish pubescence, the anterior and middle legs with their tibiæ covered with a seal-brown pubescence, the femora with whitish pubescence, the tarsi externally with a pale brown pubescence, internally with a reddish-brown pubescence, posterior legs with whitish pubescence on the femora except at tip, where there is, as it were, an epaulet of dark brown pubescence to cover the joint, tibiæ and outer face of metatarsus with pale ochreous pubescence margined with reddish coarser hairs, the apical edge of the metatarsus provided with a broad thick brush of hairs, the brush reddish brown at base, fuscous on apical half.

Abdomen with very conspicuous whitish fasciæ, occupying from somewhat more than one-half the segment to nearly two-thirds on segments 2–3–4, the fasciæ occupying the apical portion of the segment, the basal portion being occupied by short black pubescence fringed with sparse long hairs; the penultimate segment has the pale fascia represented by a short bar on each side, the space between being covered with black pubescence; ventral segments fringed with pale, almost erect, pubescence, which is broadly interrupted in the middle by dark pubescence; the second ventral segment with a basal bilobed area that is transversely finely striate, and occupies somewhat more than one-third of the segment; the lobes of this area almost form semicircles.

Tegument black, tarsi more of a brownish hue, claws pale brown on basal half, dark brown on apical half, greater portion of apical half of the external aspect of the mandibles almost straw colour.

♂.—Tegument much as in the ♀; clypeus with shallow, nearly adjoining, not sharply defined punctures; first joint of the flagellum nearly as long as the second plus one-half the third; covered with a cinereous pubescence which is tinged with ochreous on the dorsum of the thorax, the third, fourth and fifth abdominal segments with whitish pubescence on the apical half forming bands, the bands not occupying all of the apical half of the segment, the penultimate segment with a broader

band of pale pubescence, the ultimate segment with an almost parallel-sided pygidial area that has rather distinct margins, the lateral margins notched near the apex, the apical margin slightly convex; apical ventral segment nearly smooth and polished, provided with a median, broad, longitudinal channel on the basal half; spurs of posterior tibiæ simple, not hooked as in *speciosa*, to which the ♀ bears a close resemblance. Tegument black; claws brown; mandibles and antennæ black; clypeus and labrum yellow, the clypeal yellow, almost forming a semicircle, the lateral portion distant from the eye for a space equal to the width of the first joint of the flagellum.

Type Acad. Nat. Sciences, Phila., Pa.

Type locality Corvallis, Oregon.

Taken in the type locality as follows: ♀ ♀, 16th May, 2nd, 10th June, 8th July, 1898; 2nd June, 1899. ♂ ♂, 4th June, 1898; 28th May, 8th June, 1899.

Synhalonia actuosa, Cress.

♂ 10 mm. Superficially like the ♂ of *Edwardsii*, but easily distinguished from that species, also from *fulvitarsis*, *frater*, *honesta*, *intrudens*, *Californica*, *albata*, *speciosa* and *atriventris* by the strong teeth on the seventh abdominal segment.

Head nearly as long as in *Cordleyi*; first joint of the flagellum about one-half as long as the second.

Thorax dull, dorsulum minutely granular, not punctate; enclosure of metanotum in sculpture practically as in *Cordleyi*, but with rather abundant pubescence, so that the sculpture is nearly obscured; wings differing from *Edwardsii* in having the first recurrent nervure received by the second submarginal cell a little beyond the middle, and a little more distant from the second transverse cubitus than the space between the insertion of the second recurrent nervure and the third transverse cubitus; posterior tibiæ with simple spurs, the longest of which is about as long as the second tarsal joint.

Abdomen with long white pubescence on the first two segments, this pubescence being concolorous with that of the head and thorax, the succeeding segments, except the penultimate, with black pubescence; on the penultimate segment the pubescence is very pale golden brown, except at base, where there is a fringe of brown and black hairs; the first two ventral segments have whitish pubescence, the succeeding segments brownish pubescence, with whitish laterally; the seventh ventral segment is nearly

smooth, and has a longitudinal impression, which has a narrow longitudinal elevated portion ; on each side of this segment, near the lateral margin, is a stout, short tooth shaped like a beak, and directed backward and downward ; the pygidial area has converging sides, which are straight throughout ; the apex is rounded, and has the appearance of being slightly emarginate. Black ; antennæ and mandibles black, clypeus yellow, with a broad lateral and narrow anterior and posterior borders black, the yellow mark on the clypeus almost quadrate, the lower half being dilated somewhat beyond the limits of the upper half, labrum with a yellow spot occupying nearly all of the middle third of the basal two-thirds ; tarsi and claws brown or brownish ; nervures nearly black.

Type Acad. Nat. Sciences, Phila., Pa.

Type locality, Corvallis, Oregon.

Corvallis, 1st May, 1897 ; 10th May, 1898 ; 3rd June, 1899. One specimen has the pale pubescence tinted with ochreous.

Melissodes, Latr., and *Synhalonia*, Patt.

♀

Dorsum of thorax with ochreous hair, second abdominal segment entirely black, segments three and four with a distinct band of white pubescence, that of the third interrupted in the middle, the fifth segment with black pubescence, interrupted by white band at the edge *Synhalonia lata.*

Thorax and abdomen much as in the preceding, but the second abdominal segment with a broadly interrupted band, and the fifth segment without a pale mark, entirely dark brown *desponsiformis*, Ckll., n. sp.

Thorax with pale and dark hair, the abdomen with a distinct pale band across the second segment 1.

1. Pale hairs of the body ochreous, the dark hairs of the dorsum dark brown, and not very conspicuous *menuacha.*

Pale pubescence of the body white or whitish, the black hairs of the dorsum very numerous and conspicuous *menuacha Vernonensis.*

♂

Antennæ entirely black 1.

Antennæ reddish beneath 2.

1. 12 mm. long ; black, with whitish pubescence ; labrum yellow *nigricornis.*

8 mm. long ; black, with whitish pubescence ; labrum black *microsticta*, Ckll., n. sp.

2. Pubescence ochreous, mandibles with a yellow spot at base *menuacha.*

Pubescence white, mandibles black *menuacha Vernonensis.*

Synhalonia lata, Prov.—Faune Ent. Can. Add. to Vol. II, p. 302, 1889, ♀.

Vancouver (Taylor).—This may be the ♀ of *Synhalonia Edwardsii*. Prof. Cockerell is of the opinion that it is *Synhalonia Edwardsii*, v. *latior*.

Melissodes desponsa, Sm. race?

M. desponsa, Sm.—Brit. Mus. Cat. Hym., II, p. 310, 1854.

♀, Corvallis, Oregon, 11th March (Cordley). A form that may prove to be a new species.

Melissodes menuacha, Cress.—Trans. Am. Ent. Soc., I, p. 338, 1867–68, ♂.

Oregon (A. E. S. Coll.).

Melissodes menuacha Vernonensis, n. subsp.

Type Acad. Nat. Sciences, Phila.

Type locality, Vernon, British Columbia.

Vernon, B. C., ♀ ♀, ♂ ♂, 11, 9th, 15th, 17th Aug., 1904 (Harvey).

Synhalonia nigricornis, Prov.—Faune Ent. Can. Add. to Vol. II, p. 302, 1889, ♂.

Vancouver (Taylor).

Melissodes desponsiformis, Ckll., n. sp.—"♀. Length about 14½ mm.; black, with black and yellowish-white pubescence; hair of legs black, yellowish-white on outer side of hind tibiæ and base of their tarsi. Very closely allied to *M. mysops*, Ckll., from Maybell, Colorado, but differing as follows: Hair of face, cheeks and vertex sooty, palest on vertex; last joint of flagellum longer, being much longer than the penultimate; disc of scutellum duller and much more closely punctured; less of the anterior part of mesothorax covered by pubescence. From *M. enici*, Rob., it differs by the abdomen having distinct but thin hair-bands, and also being narrower, with the hair on fifth segment a dark purplish-brown instead of pure black; also by the more sparsely and less strongly punctured disc of mesothorax.

"*Hab.*—Corvallis, Oregon, '11–3' (*Cordley*). The following table separates four closely-allied species (♀):

Cheeks with black or sooty hair 1.
Cheeks with yellowish-white or grayish-white hair 2.

1. Abdomen without hair-bands; middle of mesothorax strongly and closely punctured (E. States) *cnici*, Rob.
 Abdomen with pale hair-bands on segments 3 and 4, and a line on each side of 2; middle of mesothorax shining and rather sparsely punctured (Oregon) *desponsiformis*, Ckll.
2. Dorsum of thorax with a good deal of black hair; inner orbits parallel (Colorado) *mysops*, Ckll.
 Dorsum of thorax without black hair; inner orbits diverging above (Colorado) *Glenwoodensis*, Ckll."

(Cockerell MS., April, 1905.)

Melissodes microsticta, Ckll., n. sp.—" ♂. Length about 8½ mm.; black, with abundant long and loose dull white hair, that of disc of thorax purplish-black, and some of the same on vertex; eyes light grayish-green; inner orbits converging below; head not unusually broad; mandibles black, except a yellowish apical stripe; labrum black; clypeus light yellow, with the upper part black, the yellow area quite twice as broad as high; antennæ long (about 7½ mm.); flagellum black above, the apical margins of the joints very narrowly white; below the flagellum is dark reddish-brown, with a ferruginous dot on each joint except the first and last; mesothorax and scutellum shining, rather sparsely punctured, the middle of mesothorax with an impunctate area, around which are scattered punctures very irregularly arrayed; tegulæ shining dark reddish; wings clear, nervures dark fuscous; second submarginal cell very broad, nearly as broad as first, receiving the first recurrent nervure near its end; third submarginal cell broader (longer) than first, narrowed rather more than one-half to marginal; legs black, with pale pubescence, claw-joints ferruginous; hair on inner side of tarsi light orange; hind spurs straight and simple, yellowish-white; abdomen small, black, hind margins of segments broadly brownish, the extreme margins whitish; hair of abdomen dull white, forming fairly distinct bands on hind margins of segments (style of *M. agilis*), that on sixth segment and apex pale orange; the usual four lateral spines present, but small. Allied to *M. confusa*, Cresson.

" *Hab.*—Vancouver I. (Cresson collection.) "

(Cockerell MS., April, 1905.)

OVIPOSITION OF *BIBIO FEMORATA*, WIED., AND OVIPOSITING FEMALES.

BY ALECANDRE ARSENE GIRAULT, WASHINGTON, D. C.

On the morning of March 24th, 1904, at 9 o'clock, in the town of Paris, Texas, many dark-coloured flies were noticed crawling over the trunks and lower limbs of two adjacent box-elder trees (*Negundo* species). They proved to be the above species.*

They were found in various positions. Some resting in crevices of the bark, or crawling about on the trunk, while others were resting in clumps of grass and weeds along the gutter and fences near the two trees. The latter were situated on the edge of a sandy sidewalk, about six feet apart, and about eighteen inches above the gutter, which was unstoned and abounding in patches of grass and weeds.

Both sexes were present, the females greatly predominating; a few pairs were in copula. They suddenly disappeared about forty-eight hours afterwards, but again on March 29th others appeared in numbers on the same trees. As formerly, these in turn remained several days, but gradually disappeared, many apparently killed by heavy rains which occurred at that time.

I. *Adults and adult habits.*

The females are dark reddish, with garnet thighs and black wings; they varied in length, in six specimens measured from 9 to 11.5 mm. Their abdomens are thick, cylindric and heavy, especially following copulation. The males are smaller, from 8 to 10 mm., with slenderer, tapering abdomens, more hairy bodies, and very much larger eyes. Their wings are transparent.

Copulation takes places about twelve hours after emergence from the soil. It was observed on the 24th and 25th of March. As the larvæ are gregarious, the eggs being deposited in a single mass, the descendants from a single female doubtless emerge simultaneously from the soil, as in this case, and crawl up any convenient object near-by. Here the sexes intermingle freely and mate.

The flight of the gravid female is heavy and slow, and apparently seldom resorted to. Crawling seems to be the natural mode of locomotion, although the adults are able to fly considerable distances. They

*Determined by Mr. Charles T. Brues.

crawl quite fast and with regularity. Nothing of material importance was learned in regard to their food habits.

When confined in spacious glass jars containing fresh sod, the females wandered about a great deal through the grass at first, but soon commenced to enter the earth to oviposit. In confinement they were often unsuccessful in this, owing to improper conditions of the soil supplied; but under proper conditions they quickly become used to confinement, and naturally perform their functions.

The length of life in both sexes averages about three days. The males apparently die immediately after copulation is finished, and they take no part in the process of oviposition.

II. *Oviposition and ovipositing females.*

1. Laboratory methods.

Supposed fertilized females were confined in glass jars (10 cm. diameter by 15 cm.) containing eight centimetres of ordinary grass sod taken from moist sandy loam or other soils. The jars were covered with muslin, which overhung the sides, making it quite dark within. Four jars were thus started and kept in the laboratory. Oviposition was easily observed, as the females generally entered the earth at the sides, and thus every movement could be seen. In one jar males were present with the females.

2. Details of ovipositing females.

The method of oviposition in *Bibio* is highly interesting because of the peculiar habit of entering entirely within the soil, and also because the parent's life is at once given up for the sake of its progeny. The female literally buries itself within the earth, and after deposition dies there.

After wandering about for several hours amongst the grass, the insect commences to search for a suitable place at which to enter the soil. When confined as described, they almost invariably selected a spot near the side of the jar, and would always select, if present, a spot where the earth was cracked, or where a crevice of some kind existed. Here they begin to dig by using their stout anterior tibiæ, described later, continuing until several centimetres below the surface. Oviposition then takes place as given in the following details:

A.—Nine females were taken from the trees when first observed, on the 24th of March, and confined at 10 p.m. in one of the large jars mentioned in foregoing. Some of these were known to be fertilized, while the

others were in all probability so, as the sexes were then freely copulating. Oviposition had taken place by the following morning (25th), in two cases the females having burrowed to a depth of two centimetres. They were still within the burrow, apparently going deeper into the earth.

By the afternoon of the 25th two other females were digging along the sides of the jar; one was on its back, a centimetre below the surface, the other going head first and about 7.5 millimetres beneath. Four females were thus below the surface; two of them had deposited, while the other two were still burrowing. Four others were then crawling restlessly about in the dense grass, making futile efforts to enter the ground. A fifth, or the ninth, was found on its back dead, its head buried in the earth.

By the morning of March 26th six females had deposited their eggs, four during the night just passed; the seventh died before finishing its burrow. The eighth had not as yet succeeded in penetrating the soil; after doing so it died in its burrow.

a.—This female oviposited in the early morning of March 25th, or less than eighteen hours after confinement. It was lying in a doubled-up position, in an apparently closed earthen cell, the egg-mass to one side. The body was nearly vertical, the head below, the insect lying on its back to one side of, and slightly beneath, the egg-mass. To all appearances it was dead. The entrance to the burrow at the surface of the ground was unnoticeable, filled as it was with loose soil particles. No movements of the body were afterwards observed, and it is evident that the insect died a few hours after deposition. By March 30th the body was decomposing, and very moist.

b.—Oviposited in the early morning of March 25th, or less than eighteen hours after confinement. After oviposition the female lay in a cramped position, in a cell similar to that of the preceding. The body was vertical, inclined somewhat, and with the head above. The insect was apperently dead. The entrance to the burrow was not noticeable.

No further movements of the body were detected, and six days later the body was covered with the spore-bodies of a fungus. By the 9th of April it was badly decomposed.

c.—On the afternoon of March 25th this female was found in an inclined burrow, on its back, about two centimetres beneath the surface. It was scooping the earth over its head by means of its fossorial anterior

tibiæ, passing it over the venter, and from thence out of the burrow, with its slender posterior pairs of legs. Hence its head was at the bottom of the burrow, the body inclined upward.

Oviposition commenced very early in the morning of the 26th. The eggs were being massed across and around the tip of the abdomen, about 1.3 cm. down the burrow, and 1 cm. directly below the surface of the soil. The entrance to the burrow was unnoticeable.

At 9.30 a.m. the insect was in the same position, on her back, the body inclined upward, the abdomen highest, the anterior legs stretched out beyond and above the head in the position assumed while digging. Further extension of the burrow had probably been stopped by masses of intertwined rootlets. The eggs were then being placed quite irregularly, above and below the caudal half of the abdomen, sometimes in clusters of regular rows, mostly simply massed together. The individual eggs were placed methodically at the rate of from six to eight per minute, by simple movements of the tip of the abdomen. By this time she had effectually bottled herself within the burrow with eggs, which, as indicated, were then massed directly across the burrow, above, below and in front (caudad) of the abdomen. The burrow itself was not clearly defined, but filled with loose particles of earth, which were also mixed in with the egg-mass.

By 3 p.m. oviposition had apparently stopped, the period thus being about twelve hours. The position of the body had not changed, but the whole of the caudal half of the body was then nearly covered with eggs, while the wings extended beneath most of the mass, forming a good foundation. The female was thus actually pinned down. The mass itself was broadest at its bottom or base, and extended from one side of the burrow to the other ; it measured approximately 3 mm. (apex), by 4 mm. (base), by 6 mm. (depth). The burrow measured at its greatest width 8 mm. The insect's posterior two pairs of legs were extended out and up, the caudal pair crossed.

The female remained perfectly motionless after oviposition ceased. Gradually moisture gathered about the egg-mass and body, until at last (April 1st) both were bathed in it. About April 9th the body commenced to sink, and was highly decomposed.

d.—This female was also found burrowing on the afternoon of the 1st of April. It was but 1.2 cm. directly below the surface, in a rather

long and irregular burrow, measuring in length 2.6 cm. It entered the earth, of course, head first, and burrowed in a direction slightly inclined from the horizontal for a distance of 1.5 cm. Then abruptly turning downwards in a direction perpendicular, it burrowed for a distance of a single centimetre. At this point she died, apparently from exhaustion. Another female was observed to enter the burrow while she worked, but retreated upon finding it occupied. On March 31st the body was extracted with a pair of forceps; it was decomposing, and readily fell to pieces. Above the bend the burrow was 6 mm. wide, and from thence down 4.2 mm. Its entrance was barely noticeable. It is shown in outline at figure 15.

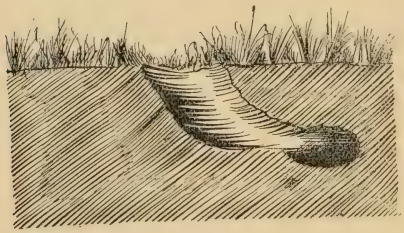


Fig. 15.

e.—Entered the soil during the evening of March 25th, and eggs were found deposited on the morning of the 26th, about 2 cm. directly below the surface. They were in a more or less regular mass, most of them placed in rows on end against the glass of the jar; a few were placed flat against the side of the jar. The mass was at the extreme bottom of the vertical burrow. The latter was 6 mm. wide.

The parent was directly above the egg-mass, the head, obviously, up, and but 5 mm. beneath the surface. The entrance to the burrow was inconspicuous, the upper half of the burrow itself being filled with loose earth pushed into that part of the burrow during excavation.

Finally the parent was disturbed with forceps, in order to find its relative position in regard to the egg-mass. Thirty minutes afterwards, evidently on account of this disturbance, it crawled from the burrow and made attempts to escape. It was perfectly fresh in appearance. After wandering through the grass for a while, it went to the entrance of its burrow and made long and persistent efforts to re-enter, but in vain. By the following morning it was resting in the grass, very weak; fifteen hours afterwards it died.

The eggs from this female were carefully removed from the soil and counted. They reached a total of 2,604.

f.—Began to burrow during the evening of March 25th, and eggs were found on the following morning, or about fifteen hours after starting to dig into the earth. The burrow was vertical.

g.—This female was crawling over the surface of the soil late in the afternoon of March 25th, searching for a suitable spot at which to enter. Accordingly a hole eight millimetres in diameter was made for her by pushing the blunt end of a pencil into the earth.

On the morning following eggs were found deposited in two masses, one at the bottom of the hole, and the other on the surface of the soil at its edge. The hole was eight millimetres deep. The parent was observed to crawl into the hole several times, but was apparently dissatisfied with it, and deposited no more eggs. Instead she made many efforts to enter the earth elsewhere, but failed. On the morning of March 28th she was very weak, and during the afternoon died.

No attempt to cover the eggs was made, though after they were dug up some were found to have been buried in the earth at the bottom of the pit. There were 3,007 eggs in the combined masses.

h.—Although not succeeding in getting into the earth, this individual scattered her eggs in small masses through the grass. It died on the morning of March 17th, in a position indicating a last effort to get beneath the soil. The eggs, exposed to the air, shriveled up in a very few hours.

i.—This female died soon after confinement. Made persistent attempts to enter the earth.

B.—At 1.30 p.m., 29th March, six females were taken from the two trees and confined as in foregoing, the jar containing compact loamy soil. They continued to wander through the whole of the next day, and by the morning of the 31st none had as yet succeeded in entering, though trying hard to do so. One was then found dead, in a slight depression, near several hundred of her eggs, in a mass on the surface of the soil. The remaining five were showing evident signs of weakening, and, as expected, were on their backs dead on the morning following. A few eggs were scattered here and there over the surface. They soon dried up.

Although these females freely entered loose earth present, getting some distance beneath, they refused to oviposit in such places, and always

returned to the surface. It is thus indicated that they are unable or unwilling to deposit in brittle, and unable to enter clayey soils.

C.—On March 29th, at 1 p.m., a single female was confined as usual in a much smaller glass jar (7.5 by 5.5 cm.), containing 3.5 c.m. of loamy sod. It began to crawl about at once, and frequently entered loose earth, only to return again to the surface. It was unable to enter the compact clayey loam, and soon died.

D.—On March 26th, in the afternoon, another female was confined as the preceding. She appeared to be rather weak, and not until about noon, 29th March, did she succeed in entering the earth (between these two dates there was quite a fall in temperature; the 29th was much milder).

Several hours afterwards oviposition began. The eggs were deposited beneath the body, the latter arched or curved upwards, and with one side against the jar. At 5 p.m. she was burrowing towards the centre of the jar; during this process the two posterior pairs of legs were held inert, and somewhat out of the way.

The eggs were placed irregularly against the glass, 1.6 cm. below the surface of the soil; the burrow was vertical, or nearly so. On March 30th the insect was lying in a confused heap on its back, about 3 mm. above the egg-mass, and with its head nearest the surface; loose particles of soil intervened between the eggs and her body. She was but 5 mm. from the surface, and could easily have broken through to the air. She died in the position described.

E.—At noon, 29th March, eight females and three males were confined in one of the larger jars, where they at once began to crawl about. Two pairs were then in copula.

Later in the afternoon, at 4 p.m., the females, excepting those in copula, were attempting to enter the earth, and were eagerly searching for likely crevices at which to start their burrows. While doing so, several crawled into a space between the glass and soil, full of loose particles, and worked quite a pathway through to the bottom of the jar. From this branches were started, but soon abandoned, and the insects finally always returned to the surface to renew their efforts elsewhere. This again indicates that loose soil is not to their liking.

However, two of the females again went into the channel, and began to wedge themselves into firmer soil, working through and up towards the surface, in continuation of the original burrow. They progressed solely by the use of the fossorial tibiæ, moving them alternately like paddles.

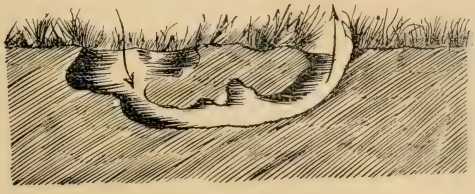


Fig. 16.

The path which they made through the soil, after digging through to the surface, is shown in figure 16.

Afterwards the insects were continually passing through this, apparently always in the direction indicated by the arrows in the figure, which was the direction taken when the burrow was formed. In but a single instance was a male observed to enter it. This occurred while following his mate, and had no significance.

All of the insects died within a few days, without having accomplished their purpose.

III.—*Eggs, description and number deposited.*

The eggs are of the usual dipterous type, flesh-coloured, sub-linear, and with the ends obtuse or rounded. One end is slightly curved and thickened. They are opaque, smooth, or very minutely punctate, showing no marked sculpture, and slightly variable in shape. Length 0.5–0.7 mm. minute, but visible to naked eye.

They are deposited in numbers varying from two to three thousand, in compact, irregular masses, in sandy soil. If exposed to the atmosphere they shrivel up and die. No marked external signs of embryonic development are present.

The length of the egg stage is about two weeks or longer.

IV.—*The fossorial anterior tibiæ.*

The digging apparatus of the female consists of rather short, depressed, anterior tibiæ, more or less hollowed ventrad, and bearing at the distal end two conspicous stout *spurs*, the outer of which is depressed and much longer than the inner (mesal). They are admirably fitted for the purpose used. (Fig 17 : Portion of anterior leg, ventral view, showing the fossorial tibiæ ; *a* and *b*, mesal and lateral spurs; *c*, portion of basal tarsal joint; *d*, distal three-fourths of tibia. Greatly enlarged.) When thrown forward and forced into the earth, and then drawn back, they hold the earth like a shovel. The males possess the same structure, though relatively more slender. As would be expected, the anterior femora are much stouter than the others.



Fig. 17.

The two posterior legs are assistants to the anterior, and for that reason they are much slenderer and longer. Their tibiæ bear short, slender spines ; those of the anterior tibiæ are true spurs or chitinous prolongations of the part, wholly immovable. The legs are well clothed with hairs.

There are very few references to this species in our literature, practically none bearing on its habits and life. This is apparently the first published record of the method of oviposition of a *Bibio*.

The figures were kindly drawn by Mr. John F. Strauss ; the writer is also indebted to Prof. A. L. Quaintance, Washington, D. C., for timely suggestions.

Mr. Franklin Sherman, Entomologist of the North Carolina Department of Agriculture at Raleigh, has been appointed Professor of Entomology and Zoology at the Ontario Agricultural College, Guelph, Canada, and enters upon his new duties this month.

Mr. O. W. Barrett, Entomologist and Botanist of the Porto Rico Experiment Station, has been appointed to the new office of "Plant Introducer" in the Bureau of Plant Industry at Washington, and will have charge of the distribution of tropical and sub-tropical plant stock and the inspection and quarantine of both imports and exports of plant shipments.

WHOM SHALL WE FOLLOW?

BY RICHARD F. PEARSALL, BROOKLYN, N. Y.

The recently-published article from the pen of Rev. Geo. W. Taylor, giving a rearrangement of the species now included under the genus Venusia, Curtis, under the same caption used by me in a previous paper, gives me, I think, a right to protest. He refuses to accept the separation of *12-lineata*, Pack.? under a new genus, as given by me; but if the two male specimens, which were sent through the kindness of Mr. Geo. Franck, reached him safely, I think he will be satisfied on this point. *12-lineata*, Pack., was described from specimens taken in California by Mr. Hy. Edwards, and eastern specimens credited with this name were really the species I described as *Euchœca salienta*. I grouped with this latter the western species mentioned by Mr. Taylor, not having at hand enough material upon which to base a separation, yet as more of it comes to me, I am tending toward the conclusion that it is worthy of a specific name, but this can wait. Now, as to *perlineata*, Pack., if the plate published of it (Boston Soc. of Nat. Hist., Vol. 16) is to be relied upon (I have not seen the type), then it is clearly the species we have been calling *comptaria*, Walk., as determined by Dr. Hulst. But *comptaria* is not *comptaria* any longer, according to Mr. Prout, and so, vide Mr. Taylor, it becomes *perlineata*, Pack., and my *salienta* becomes *comptaria*, Walk. It is, then, a question of whose authority we shall accept, that of Dr. Hulst or Mr. Prout. Until some one well drilled in the various American geometrid forms, carrying abundant material with him, shall go to Europe, and compare the types there with it, Mr. Taylor, for instance, I am not ready to change the decisions arrived at by Dr. Hulst. He had studied this group many years before he journeyed across twice, carrying material with him, for the sole purpose of establishing the types, and his decisions are entitled to stand, unless they go down before the weightiest authority. He may have made mistakes in determinations, and *did*, in naming off hand, later on in his life, but I claim that having an object clearly before him, the sole performance of which took him abroad, he would be less likely to fall into error, knowing also that his was pioneer work, and so much depended upon its correctness as a basis for the future worker. I can show to Mr. Prout specimens of *E. comptaria*, Walk., from this region (Catskill Mts.) which almost anyone would call *E. lucata*, yet in all the fifteen years of my collecting here I have never taken the latter species. I make this statement, not to discredit Mr. Prout's judgment, but to point out how easily one may be misled unless thoroughly familiar with the range in variation in each species, and the appearance which such variations present when rubbed, suffused or melanistic. This year I have

had two of Mr. Merrick's trap lanterns running nightly, and among hundreds of specimens have found neither *lucata* nor *salienta*. Walker's type of *comptaria* came from Nova Scotia, and I do not believe that *salienta* is found there. If, only one hundred miles above New York City, which I consider about its northern range, I am unable to find it, then it is unlikely that it ranges coastwise so far above this latitude, into a region so boreal. Yet if I am wrong I will be glad to receive specimens taken there in proof of it. Meanwhile I cannot accept the outcome of Mr. Taylor's revision, and contend that *comptaria* is still *comptaria*.

NOTES ON THE LARVA OF THE PITCHER-PLANT MOSQUITO.

BY EVELYN GROESBEECK MITCHELL, WASHINGTON, D. C.

Since the discovery of *Wyeomyia Smithii* in the leaves of Pitcher. plants in New Jersey, by Dr. J. B. Smith, it has been reported from Massachusetts and Florida.

On June 16th of the present year, the writer found a larva of the second stage in a Pitcher-plant in a greenhouse in the Botanical Gardens, Washington, D. C. July 8th, three more specimens were taken there The plants had been brought from South Carolina, and had been in the greenhouse for several years. As there are now no wild Pitcher-plants in the District, the mosquitoes were probably imported in an early stage with the plants.

The larva of this species has hitherto been described as having but two anal gills. Examination of the living specimens revealed two more, making up the normal number of four These two gills are small, being only about one-third as long as the two large inflated ones, tracheated, pointed and situated dorsad of the larger pair. (See fig. 18.) In alcoholic specimens they are difficult to detect, as they shrink between the larger two, and it is necessary to remove one of the latter to see the small gills plainly.

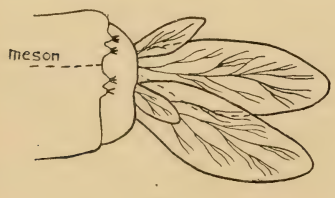


Fig. 18.

The larva, during the three days before pupation, comes frequently to the surface, before that time remaining mostly at the bottom. The favourite feeding posture seems to be with back downward, lying on the bottom of the jar.

September, 1905.

PRACTICAL AND POPULAR ENTOMOLOGY.—No. 9.

The Buffalo Carpet Beetle,

(Anthrenus scrophulariæ, L.)

BY JAMES FLETCHER, OTTAWA.

This destructive enemy of the housekeeper is evidently rapidly widening the area in Canada within which it occurs as a household pest. Strange to say, the species has been found abundantly on flowers out of doors in some localities where it has never been noticed inside houses. Twenty-five years ago many specimens were sent to me by a collector from Fort McLeod, N.-W. T., and specimens are found in entomological collections in all parts of the Dominion.

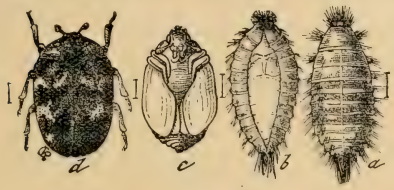


Fig. 19.

The Buffalo Carpet Beetle, however, has proved destructive to woollen goods and furs only in certain districts, as in Western Ontario, the Eastern Townships of Quebec, and the Annapolis Valley in Nova Scotia. Unfortunately, every year fresh localities are added to those where it has assumed the troublesome habit of injuring wearing apparel, carpets, etc.; and demands for remedies are very frequent during the spring months, when the prettily marked beetles are found in windows of houses or on garden flowers. The life-history is briefly as follows :

Winter may be passed either as larva, pupa or perfect beetle; when out of doors, it is probably, as a rule, in the larval form, although I have found a perfect beetle in April in the folds of an old sack hanging on an apple tree. The beetles, which are black, marked across the back with three indistinct white bands and with a bright scarlet irregular stripe down the middle, are about ⅛ of an inch long and oval in shape. They are oftenest noticed in spring, when they sometimes swarm in the flowers of tulips, particularly those of red and yellow colours, and upon some kinds of Spiræas. At this time of the year they frequently fly into houses, where eggs are laid and the larvæ hatch in a few days. The larva is black and oval in shape, covered with short, stiff bristles, with longer tufts of bristles in front and behind. It is rather active, crawling with short, jerky movements. The

length of the larval condition is very uncertain; with plenty of food, development is rapid; but with lack of food, the larval period is extended to many months. Under normal conditions there are about six moults, and not more than two annual broods in Canada. When full-grown the larval skin splits down the back, showing the waxy white pupa inside, from which, in time, the perfect beetle emerges. (Fig. 19: *a*, larva, upper surface; *b*, under surface; *c*, pupa; *d*, beetle—all greatly magnified.)

Remedies.—When once established, this is a very hard pest to get free of. A few individuals will soon re-stock a whole house; so, thorough work is very necessary. As the beetles enter houses by windows, probably at night, fine mosquito netting should be put on early in the season. At house-cleaning time all carpets should be taken up regularly and thoroughly beaten out of doors. The floors, after thorough sweeping, should be scalded with hot water. When dry, benzine or gasoline should be driven into all crevices with an atomizer. Before replacing the carpets, the crevices of the floors should be well brushed out and the floors dusted with a mixture of equal parts of pyrethrum insect powder and ground cloves. If the odour is not objectionable, strips of tarred building paper may be put round the edges of the rooms beneath the carpets. In chests of drawers, etc., the contents should be frequently examined and small bags containing ground cloves should be packed away in them. The remarkable preference of this insect for articles of red colour has led some to lay rolls of red flannel in drawers to act as traps. These must be taken out and scalded at short intervals.

BEES COLLECTED BY THE REV. G. BIRKMANN IN TEXAS.

BY T. D. A. COCKERELL, BOULDER, COLO.

(Continued from page 267).

Melissodes grandissima, n. sp.

♀.—Length nearly 19 mm.; length of anterior wing about 13 mm.; breadth of abdomen in middle 7 mm.; in all respects like *M. Comanche*, Cresson (co-type compared), except as follows: Abdomen broader; fourth segment without a bare median area, the broad grayish-white band continued right across; fifth and sixth segments with the hair purplish-black, except the long hair at sides, which is paler and redder; hair of venter not so red; hair of inner side of basal joint of hind tarsi reddish-black, ferruginous basally; wings hardly so dark; black hair-patch on mesothorax

shorter, so that it is conspicuously broader than long; flagellum dark, with only a faint red tinge beneath; hair on outer side of basal joint of middle tarsi brownish-black (rufo-fulvous in *Comanche*). From *M. helianthelli*, Ckll., it differs in the colour of the hair on the hind tarsi and apex of abdomen, etc.

Hab.—Fedor, Texas (*Birkmann*). This may be a race of *M. Comanche*, but in the absence of intermediates I leave it as a species. It runs in my tables next to *M. Coloradensis*, Cress., from which it is easily known by its larger size and other characters.

Mr. Birkmann also took at Fedor *M. atripes*, Cr. (June 8), *M. obliqua*, Say (May 29), and *M. intorta*, Cr.

Entechnia fulvifrons (Smith).

Fedor, in August. The bees of this genus seem quite unable to fold away their long mouth-parts; they always carry them, when at rest, underneath the body, like the beak of an hemipteron. The present species extends to the Argentine and Bolivia, whence it was described by Schrottky as *Meliphila ipomœæ*.

Xenoglossodes eriocarpi (Ckll.).

Fedor, June 11. New to Texas. *X. albata* (Cr.) was also taken at Fedor, June 22.

Anthophora Texana, Cresson.

Fedor, the ♂ June 12, the ♀ June 17. The ♂ (hitherto unknown) has the face-marks bright yellow, and is in all respects (including the armature of the hind legs) extremely close to *A. Californica*, Cr. The hair of the thorax above is pale echreous, and is without the intermixture of black seen in the ♀. *A. tarsata subtarsata*, Ckll., is also very closely allied, but is readily distinguishable from *Texana*, in the female by the rapid narrowing of the face below, and in the male by the admixture of black hair on the thorax above. All these insects have the same peculiar structure of the hind legs, and are evidently local representatives of a single wide-spread type. Whether we call them species or subspecies will depend upon the existence or otherwise of intergrading forms in localities not yet explored. A ♀ having the characters of *Texana* has been taken by Snow in Arizona.

BOOK NOTICE.

American Insects—By Vernon L. Kellogg, Professor of Entomology in Leland Stanford Jr. University. New York: Henry Holt & Co., 29 West 23rd Street. 604 pages.

Ten years have gone by since the publication of Prof. Comstock's "Manual for the Study of Insects," which during that time has become the recognized text-book for students of North American Entomology. There hardly seemed to be any need for another work of a similar kind, and we took up this new book by Prof. Kellogg with the feeling that there was no "long-felt want" demanding to be filled. However, on examination, "American Insects" proves to be an excellent work, and we can heartily recommend it to all who are interested in the classification and natural history of insects. It is written in an agreeable and attractive style and can be referred to anywhere by the ordinary reader without fear of being disheartened by purely technical language. There are, of course, many pages on anatomical structure, development and metamorphosis, which must necessarily be scientific and somewhat difficult for the unlearned, but the greater part of the large volume is clear and simple and most interesting to every Nature Student.

The first three chapters present the scientific introduction to the study of Entomology and will well repay a careful perusal; the next twelve treat of the seventeen orders of insects, proceeding from the Aptera to the Hymenoptera. Keys are given to the families, and a large number of species are figured and described. The concluding chapters are most interesting, dealing with the inter-relation of flowers and insects; the significance of the colours and patterns in which insects are arrayed, including "mimicry" and protective resemblance, and up-to-date information on disease bearing insects. An appendix furnishes concise directions for collecting and rearing specimens. The book is profusely illustrated with thirteen coloured plates and over 800 figures in the text—a large number of these are excellent drawings made expressly for the work by Miss Mary Wellman.

The author states that the book is written "in the endeavour to foster an interest in insect biology on the part of students of natural history, of nature observers, and of general readers." He has certainly well fulfilled his task, for no one can take up the book and open it anywhere without becoming deeply interested in the subject treated of, whatever it may be, provided, that is, that he has any love at all for living creatures, any interest in the myriad forms and modes of life of these wonderful beings that are everywhere about us.

Mailed August 31st, 1905.

The Canadian Entomologist.

Vol. XXXVII. LONDON, OCTOBER, 1905. No. 10

NOTES ON THE EARLIER STAGES OF SOME CANADIAN TIGER MOTHS OF THE GENUS *APANTESIS*.

BY ARTHUR GIBSON, CENTRAL EXPERIMENTAL FARM, OTTAWA.

Since the appearance of a paper in the May and June, 1903, numbers of the Canadian Entomologist, the writer has received for study either eggs or larvæ of several species of *Apantesis*, information as to the earlier stages of each of which was limited. The past three seasons in Canada have not been remarkable as to the abundance of material to collect, and Arctians, like many other kinds of moths, have been very scarce. Consequently not as many species have been received for study as had been hoped.

Virgo.—331 eggs of this species were kindly forwarded in 1903 by Miss Caroline G. Soule. They were laid at Brandon, Vt., on July 23, 24 and 25, and hatched on August 5, 6, 7 and 8. The eggs of *virgo* are the same in appearance as those of other moths of the genus, but are larger, measuring in width at the base 0.8 mm., and in height 0.8 mm.; in shape semi-ovate. As notes were taken on the larval stages, these are presented herewith.

Stage I.—Length when hatched 2.5 mm. Colour at first sordid white, after feeding pale greenish. Head 0.4 mm. wide, dark brown, excepting clypeus, mouth-parts and space above ocelli, all of which are pale. Thoracic shield blackish. Tubercles shiny, blackish, i about one-fifth the size of ii, which is the largest; iii nearly same size as ii, others smaller than iii; ii, iii and iv encircled with blotches of pale orange. Bristles faintly barbed, black from i, ii and iii, silvery from other tubercles. Ventral surface pale. All the feet dull blackish; thoracic feet rather translucent.

Stage II.—Length just after moulting 4 mm. Head 0.6 mm. wide, blackish. Body after feeding dark sea green. A pale bluish dorsal stripe is present in this stage. Tubercles black, conspicuous, shiny, each bearing a bunch of bristles of varying lengths; dorsal bristles black, subventral ones silvery. The tubercles are surrounded or encircled with blotches, as

in previous stage, but the colour is now a distinct reddish brown. Spiracles black, close in front of tubercle iv. Thoracic feet black ; prolegs slightly darker than ventral skin.

Stage III.—Length 7 mm. Head 0.8 to 0.9 mm. wide, black, shiny; slightly bilobed. Body dark, almost smoky, with a tinge of green, becoming paler ventrally. Dorsal stripe dull orange, rather indistinct. Along the sides, above tubercles iii and iv, are two series of dull orange dashes, one above each tubercle, not very distinct. Bristles as in last stage. Spiracles small, black. Thoracic feet blackish, prolegs concolorous with venter, darker exteriorly.

Stage IV.—Length 10 mm. Head 1.1 to 1.2 mm. wide, jet black. Skin of body velvety black, duller ventrally. Tubercles black, each bearing a bunch of finely barbed bristles, those from i, ii, iii and upper part of iv being black, lower bristles pale rusty. No markings on the body. Spiracles black.

Stage V.—Length 17 mm. Head 1.6 to 1.8 mm. wide, black as before, epistoma pale. The larvæ in this stage did not show any difference from Stage IV. The velvety black of the body is the same as in the mature larvæ.

On Sept. 26 six specimens moulted for the fifth time. At this date, and for some days previous, the larvæ, which were in a healthy condition, showed signs of hibernation, and practically ceased feeding.

Stage VI.—Length 30 mm. Head 2.4 to 2.6 mm. wide. In this stage the bristles from tubercles i, ii and iii in most of the specimens are all black, but in some there are rust-red bristles on the dorsum of segments 2, 3 and 4, particularly on segment 2. One specimen had all rusty bristles from all the tubercles, on segments 2 to 7 inclusive. Tubercles shiny, black. Spiracles orange. In one specimen these were all black. No markings of any kind on the body.

Unfortunately, not many of the larvæ came through hibernation successfully, although we tried several different methods of hibernating them. Those which did come through alive soon died.

Mature Stage.—In the May, 1903, number of the CANADIAN ENTOMOLOGIST notes are given on the mature larvæ. After this paper was written Mr. C. H. Young gave me three mature larvæ collected in May, near Ottawa, all of which showed traces of a dorsal stripe, and had tubercles i, ii and iii black ; iv, v, vi, vii and viii all reddish excepting in one of the specimens, which had vii and viii almost black. One of these larvæ pupated on May 27, the moth emerging on June 24.

PARTHENICE.—A female moth was found on a blade of grass, at Meach Lake, near Ottawa, by Mr. C. H. Young, on Aug. 27, 1903. About 375 eggs were laid on the 29th and 30th. These were handed to the writer, along with the female moth.

The eggs were laid loosely like those of other species of the genus. Width at base 0.75 mm.; height same as width. The young larvæ hatched on Sept 12, 13 and 14, and were fed on plantain and dandelion.

Stage I.—Length 3 mm.; after feeding pale greenish. Head 0.35 mm. wide, black on cheeks, clypeus pale brown. Thoracic shield almost concolorous with tubercles. On each segment of body is the usual row of transverse tubercles. These are black, i very small, ii the largest, iii nearly as large as ii, but more elongate ; all surrounded with reddish brown, the red particularly apparent at the close of the stage. Bristles finely barbed, those from the dorsal tubercles black ; others silvery. Spiracles very small, black, close in front of tubercle iv. Thoracic feet pale, translucent; prolegs darker.

Many of the larvæ passed the 1st moult on Sept. 16.

Stage II.—Length 3.5 mm. Head 0.6 mm. wide, blackish, clypeus pale. In general the larvæ are pale brown, the food showing through giving the body a greenish tinge. In this stage there is a pale dorsal stripe. The skin between tubercles ii and iii is also pale, giving the appearance of a lateral band. The venter is paler than the dorsum. Towards the end of the stage the skin changes to a dull reddish brown. Bristles from dorsal tubercles black, from lateral and ventral tubercles silvery. Feet almost concolorous with venter.

On Sept. 23 a number of the specimens passed the 2nd moult.

Stage III.—Length 5 mm. Head 0.8 mm. wide, blackish, shiny ; mouth-parts reddish. Body dark brown ; skin immediately between tubercles ii and iii, iii and iv slightly reddish, below tubercle iv paler. Dorsal stripe flesh-coloured. Tubercles black, i very small ; base of ii shining. Bristles faintly barbed, from dorsal and upper lateral tubercles all black, lower bristles silvery. Long bristles from dorsum of segments 12 and 13. Spiracles small, black, round. Thoracic feet black, shiny ; prolegs dark exteriorly.

Some of the larvæ moulted again on October 5, and others soon afterwards.

Stage IV.—Length 8 mm. Head 1.0 mm. wide. The larvæ in general are blackish, with tufts of short black bristles. Under a lens the

skin appears as dark brown. The tubercles are black and shiny, ii with a polished base as in last stage. The dorsal stripe is now inconspicuous, in fact it is only the dark brown skin of the body showing against the black tubercles which gives the appearance of a stripe. Spiracles and feet same as in Stage III.

Soon after Oct. 5 the larvæ were placed out of doors for the winter. They were put in large glass jars which contained dried leaves, among which the larvæ crawled. A cheese-cloth covering was tied to the top of the jar, and this was laid on one side, in the driest place, among a clump of cedars.

On April 27, 1904, the jar was brought into the office, and it was found that 15 larvæ were alive. At this date the snow had all disappeared in open places, and none was left where the larvæ had hibernated. After being brought into the office they were very quiet, and would not eat anything until the 29th, when some fresh food was sprinkled with water, and by the morning of the 30th the larvæ were in splendid condition, and quite a lot of frass was in the jar. Length after coming out of hibernation 9 mm.

On May 3 one larva moulted, and by the 6th nine had moulted.

Stage V.—Length 12.5 mm. Head 1.3 mm. wide, black, shiny, slightly bilobed; epistoma, median suture and margins of clypeus pale. Dark hairy larvæ, darker on dorsum. Tubercles all black, shiny, small, ii large, with a polished base. Dorsal stripe inconspicuous as in last stage. Skin just between the lateral tubercles has a pinkish tinge. Bristles black, finely barbed. Spiracles black. Thoracic feet black, shiny; prolegs, upper half black, lower half reddish, almost salmon colour.

On May 10th ten specimens moulted.

Stage VI.—Length 16 mm. Head 1.6 to 1.8 mm. wide; same as in Stage V. Skin of body now blacker. In this stage three specimens had a flesh-coloured dorsal stripe, distinct on all segments; the others, with the exception of two, which had no markings, had the dorsal stripe also, but only on the thoracic segments. Tubercles all black and shining as before; iv and lower tubercles bear mostly rusty bristles. All the other bristles on the body are black. Spiracles black. Thoracic feet mostly brown, blacker towards base, shiny; prolegs, upper half black, lower half reddish. Later in the stage the skin of body below the spiracles changes to brownish, with a purplish tinge.

Two larvæ moulted on May 17th, four the day following, and a few others later.

Stage VII.—Length 21 mm. Head 2.0 to 2.2 mm. wide. Body in general velvety black, with bunches of stiff barbed bristles. Tubercles i and ii wholly black and shiny; iii black at base, but reddish at summit; all black bristles from iii. Tubercle iv nearly all reddish, only a ring of black at base. In the majority of specimens nearly all the bristles from iv were rusty, but in one or two these were almost all black. Bristles from tubercles below iv all rusty. Tubercles v, vi and vii nearly all reddish, viii mostly black. Spiracles black. The only trace of the dorsal stripe now is on the thoracic segments, where it is very faint. Towards the close of the stage the larvæ lose their black velvety appearance, becoming paler, particularly laterally and ventrally. All the feet wholly reddish. Length of this stage at close 30 mm.

One larva moulted for the 7th time on May 24th, two on the 26th, others soon afterwards.

Stage VIII.—Length 30.5 mm. Head 3 mm. wide, shiny, jet black, except median suture, lateral margins of clypeus and space on cheeks above ocelli, which are pale brownish. Skin of body on dorsum black, shading to dark gray ventrally, overlaid particularly on dorsum with streaks and blotches of velvety black. As the specimens varied somewhat, each was examined separately. Tubercles on dorsum of thoracic segments of the first specimen described were pale yellow, with black base, those on same segments on sides reddish. Tubercle i on abdominal segments black, about one-sixth the size of ii, which is also black, with a polished base. Both i and ii shining black, not dull. Bristles from i and ii black, finely barbed. Some of the bristles from tubercles on dorsum of thoracic segments are dull yellowish. The large pair of tubercles on dorsum of segment 13 mostly amber-coloured. Tubercle iii on all segments distinctly yellowish, with black base; iv, v, vi, vii and viii plainly reddish; bristles from iii all black; from iv and lower tubercles rusty, others black; from v and vi and ventral tubercles bright rust-red. Spiracles orange, with black rim, close in front of tubercle iv. Dorsal stripe in this specimen only present on thoracic segments. Thoracic feet reddish, darkened at tips; prolegs distinctly reddish, about the same colour as tubercles v and vi.

A second specimen examined had tubercle ii on all the segments with a touch of yellow at the summit, and in this specimen the dorsal

stripe was traceable but faint along the whole of dorsum, and tubercle iv had nearly all the bristles rust-red. In this larva the spiracles on the three posterior segments were black.

A third specimen was the same as the description above.

A fourth specimen had tubercle i on first three abdominal segments tipped with pale yellow, and nearly all the bristles on the dorsum of the thoracic segments were dark dull, rusty red; tubercle ii on anterior abdominal segments was touched with yellow as in the second specimen above noted, and tubercle iv had bristles all rust-red.

A fifth specimen showed no differences from any of the above.

A sixth specimen had a faint dorsal stripe on all segments, but otherwise had no characters other than those noted above.

In all the specimens tubercle iii was yellowish, and iv, v, vi, vii and viii reddish. In some tubercles i and ii are wholly black, in others these are tipped with yellow. In all the larvæ the thoracic feet and prolegs were reddish. The dorsal stripe was faintly present on all the segments in some specimens, while in others it was only noticeable on the thoracic segments.

Towards the end of May, 1903, Mr. C. H. Young also gave the writer three mature larvæ of *parthenice*, which were found by him at Meach Lake, a short distance from Ottawa. Notes on these were taken on May 28, on which date they were 42 mm. in length.

Specimen No. 1 had a flesh-coloured dorsal stripe indistinct in the incisures. Tubercles yellowish, those below the spiracles with a reddish tinge. All the feet distinctly reddish, about the same colour as the rust-red bristles from lower lateral tubercles. Began to spin cocoon June 6, emerged ♀ moth July 6.

Specimen No. 2 same as No. 1, only tubercles i and ii black, summits of others yellow, bases black, excepting ventral tubercles, which are wholly blackish. Feet all reddish.

Specimen No. 3: Tubercles i and ii wholly black, summit of iii yellowish, iv and v nearly all yellowish, ventral tubercles yellowish-red. All the feet reddish. Moth emerged July 16.

Another larva found April 20, 1904, by Mr. W. Metcalfe, and handed to me, moulted on May 1, on May 23, and again on June 2. On June 24 this specimen measured 41 mm. in length, but then suddenly died. It had a faint dorsal stripe, tubercles i and ii black, iii pale yellow, others reddish-yellow. All the feet reddish. I have little doubt that this larva was also that of *parthenice*.

From my observations I would say that the mature larva of *parthenice* differs from the mature larva of *virgo* in the size of body, size of tubercle i, colour of tubercles, particularly on the dorsum, and in having the thoracic feet red. The bristles from the tubercles are not so stiff in *parthenice* as they are in *virgo*.

Pupa.—Length 22-24 mm., width 8.5 mm.; dull black, conspicuously pruinose; yellowish or reddish in folds of abdomen. Thorax and abdomen bear short, black, stiff bristles. Spiracles black. Cremaster shiny, blackish; bristles capitate, reddish brown.

RECTILINEA.—In my previous notes, included in the above paper, I spoke of this Arctian as being "very rare in Canada." During 1903, however, the species was rather abundant at Aweme, Man., and a nice series of the moths was collected by Mr. Norman Criddle. While Dr. Fletcher was in the West, in 1903, he stopped off at Aweme, and among other interesting things collected some Arctian larvæ. These were received at Ottawa on June 25. Unfortunately, only one of these larvæ reached the pupal state; the moth emerged on July 25 and proved to be *rectilinea*. The length of the pupal state was 19 days. This larva was a handsome caterpillar, very rapid in its movements. In length it was 33 mm., the head black, epistoma yellowish; median suture and margins of clypeus pale, the latter dark reddish brown at vertex. Skin of body in general gray, mottled with velvety black. Dorsal tubercles of a yellow amber colour, those below the spiracles of a reddish tinge. Bristles from tubercles distinctly but finely barbed, those from tubercles above spiracles mostly black, with a few silvery ones intermingled; from lower tubercles all silvery, tipped with rust-red. Dorsal stripe distinct, not broken, of a bright pale yellow colour, tinged with red on the summit of each segment. Feet reddish; thoracic feet tipped with black.

This description agrees for the most part with the description of Stage VII in my notes already published* on the larvæ of this species.

Pupa.—Length 20 mm., width 6 mm., almost black, with a reddish tinge, paler in folds of abdomen; only slightly pruinose; abdomen and thorax bearing sparsely, short, inconspicuous bristles. Spiracles concolorous with segments. Cremaster reddish, shiny, bristles capitate, of varying lengths.

At Aweme the dates on which Mr. Criddle has taken the moths are July 26, 27, August 6, 15, 17 and 25. Mr. L. E. Marmont, at Roun-

*CAN. ENT., May, 1903.

thwaite, Man., took a specimen on August 5, and Mr. E. F. Heath tells us that he has taken the species at Cartwright, Man., in company with *parthenice*. Mr. Criddle has reared the larvæ on the Northern Bedstraw, *Galium boreale*, L., and on the Veiny Pea, *Lathyrus venosus*, Muhl.

ORNATA.—Mr. J. W. Cockle, the enthusiastic entomologist, of Kaslo, B. C., has been good enough to send me the following note, which I have pleasure in including here:

"Kaslo, B. C. Larva found on ground June 3, 1904. Length extended 1½ inches. Face black. Skin of dorsum velvety black. Faint dorsal stripe, formed of irregular dashes, colour reddish-ochre. Tubercles shiny, black, most pronounced towards anus. Bristles slightly barbed and black, except a few on lower side of stigmatal tubercles, which are reddish-brown; substigmatal bristles of the same colour. A few bristles on segments 12 and 13 very long and fine, slightly roughened but not barbed. Anus brown. Thoracic feet shiny black; prolegs reddish brown. As I have so far only found one *Apantesis* here, viz., *ornata*, and its varieties, and two years ago secured one larva like the above, which duly emerged *achaia*, I have no doubt of the identity of this larva."

In 1902 Mr. Cockle sent eggs of *ornata*, but the larvæ from these all died after reaching Stage VI. The difference between these and Mr. Cockle's larva, above described, is that the latter had a broken dorsal stripe, while those reared in 1902 had no markings whatever on the body.

On May 12, 1905, a single mature larva was received from Mr. Cockle. This was 46 mm. long; width of head 3 mm. Body velvety black, shading to a slaty gray, with a purplish tinge. Tubercles all black, shiny, i about one-third the size of ii, which had a polished base. Bristles from dorsal and lateral tubercles all black, from tubercle v and lower tubercles all bright rusty. Spiracles wholly black. Faint traces of a dorsal stripe. Thoracic feet black.

On May 16 it spun a few threads of silk, but unfortunately died on the 18th.

NEVADENSIS var. INCORRUPTA.—Among some Lepidoptera sent to the Division for examination, by Mr. L. E. Marmont, of Rounthwaite, Man., were two specimens of *incorrupta* (♂ and ♀), which had been reared from larvæ found in June on *Castilleia sessiliflora*, Pursh, and described by Mr. Marmont as "yellowish brown larvæ, with a mixture of yellow, gray and black hairs; cream-coloured dorsal stripe, broken on each segment; large yellow warts across each segment. Spun up middle of

July (seven specimens), first moth emerged Aug. 6, and proved to be *A. nevadensis*, var. *incorrupta*; got 3 ♀ and 3 ♂, but could not get them to mate."

During the summer of 1904, Mr. Marmont found further specimens of the larvæ feeding on the same plant, some of which he was kind enough to send for study. Unfortunately, this food plant does not occur at Ottawa, and although the larvæ were offered several other low plants, they refused them, and soon died.

In June last, however, Mr. Marmont sent some more specimens, which arrived in perfect condition. These were found feeding on the same plant, *Castilleia sessiliflora*, but this year, although Mr. Marmont continued for a while to send us a supply of the food-plant, we had no trouble in getting them to eat dandelion and plantain.

The following description was made of the mature larvæ:

Length 38 mm. Head 3 mm. wide, shiny, wholly black, excepting median suture, lateral margins of clypeus, which are pale, and a few streaks of white above the ocelli. Skin of body gray, streaked and blotched with black, or purplish-black, which gives the whole larva a purplish tinge; skin paler ventrally. Dorsal stripe broken up on abdominal segments into spots, three on each segment, the central one of which is yellow and roundish, and immediately behind tubercle i; the other two spots are white. On the thoracic segments the dorsal stripe is almost complete. Tubercles on all the specimens very conspicuous, and decidedly yellow, almost ochre yellow; i nearly one-half the size of ii; iii not so large as ii, but larger than iv, v and vi. Bristles faintly barbed, and mostly whitish; some yellowish and black bristles from the dorsal tubercles. Spiracles black. Thoracic feet black, prolegs yellowish.

The cocoon of *incorrupta* is very slight, as in other species of the genus. One larva, which changed to pupa on July 3, produced the moth on July 20; another which pupated on July 7, emerged as moth on July 21.

Pupa.—Length 20 mm., width 6.5 mm., reddish-brown, paler in folds of abdominal segments; very slightly pruinose. Thorax and abdomen sparsely hairy. Spiracles black, with pale centre. Cremaster darker than abdomen, shiny, bearing capitate bristles of varying lengths.

Mr. N. Criddle tells me that he has found the larvæ of *incorrupta* at Aweme, Man., feeding on Lamb's-quarters.

SUPERBA.--On May 26, 1903, six mature larvæ of this species were received from Mr. E. P. Venables, of Vernon, B. C. The larva is a particularly striking one, and will doubtless prove to be one of the handsomest of the genus. The following notes were taken on the six specimens :

Length at rest 35 mm., extended 40 mm. Head 3 mm. wide, black, slightly bilobed, subquadrate ; space above ocelli brownish, with dark mottlings ; bases of antennæ pinkish ; hairs on face black, of varying lengths. Body in general appearance blackish gray. Under a lens, however, the skin is seen to be streaked and blotched with white, particularly laterally. Ventral surface of body paler, of a greenish-brown colour. The white blotches are particularly intense between tubercles ii and iii. The six larvæ vary as to the intensity and numbers of the white blotches. In two specimens the whole body is streaked and blotched with white ; and the black skin appears as markings of that colour on a white body. Dorsal stripe very distinct in all specimens ; in one almost pure white, in the others pale yellow. In one of the specimens the dorsal stripe is broken up into spots, three on each segment. Tubercles in all the larvæ black and shiny, i about one-fifth the size of ii, which has a polished base, and is the largest ; iii, iv, v and vi much the same size. Spiracles black, with a pale, indistinct orange centre, close in front of tubercle iv. Bristles faintly barbed, those from tubercles i, ii and iii being black and yellowish intermingled, those from iv and lower tubercles being either yellowish or rust-red. Thoracic feet black, prolegs reddish.

One specimen spun a little silk on May 28, but did not change to pupa until July 10. The cocoon is very simple, merely a slight covering, through which the pupa was quite conspicuous. Another specimen, which began to spin about a week later than the above, changed to pupa about July 29. The first moth (♂) emerged on August 17, and the one which pupated on July 29, on Sept. 1. In all, four moths were reared, the dates of the emergence of the other two being Sept. 4 and 10. Two larvæ were inflated.

Pupa.—Length 22 mm., width 7 mm., reddish-brown; two specimens dark reddish-brown, two pale reddish-brown, all paler in folds of abdomen. Thorax and abdomen sparsely hairy. Cremaster mahogany brown; bristles capitate, reddish-brown, of varying lengths. Whole pupa slightly pruinose.

One of the moths was kindly compared by Mr. Wm. Beutenmuller with the type of *superba* in the American Museum of Natural History, New York.

As it will be seen from the above description of the larvæ, these were much different from those of *incorrupta* received from Mr. Marmont.

VITTATA.—Another mature larva of this species came into the writer's hands the past season. This was found at Ottawa by Mr. J. W. Baldwin, under a piece of stone, on April 20. This larva answered in every way to the description which appeared in June, 1903, in the above-mentioned article, and no additional characters were observed.

On April 27 it spun a few threads of silk, and by the 29th had woven a slender cocoon. By the morning of May 1 it had changed to pupa. The moth, a ♂, emerged May 26. This larva had doubtless hibernated in the mature stage.

A NEW SUBAPTEROUS TIPULID FROM NEW MEXICO.

BY D. W. COQUILLETT, WASHINGTON, D.C.

Over a year ago the writer received from Prof. T. D. A. Cockerell, for naming, a pair of Tipulids with aborted wings, taken on the summit of the Las Vegas Mts., in New Mexico. I suspected that they belonged to some normally long-winged form, but repeated comparisons have failed to convince me that they belong to any of those represented in the National Museum. They closely resemble *Limnophila costata*, Coq., which also inhabits high altitudes in the same region, but the joints of the antennæ are much shorter and broader, besides other differences. The 16-jointed antennæ, absence of a frontal gibbosity, the comparatively short terminal joint of the palpi, glabrous eyes and spurred tibiæ seem to ally this form more to the genus *Limnophila* than to any other genus known to me. As Prof. Cockerell wishes to refer to it in a forthcoming paper, the new form may be characterized as follows:

Limnophila? aspidoptera, n. sp.—Black, the bases of the antennæ, mouth-parts, sutures of thorax, lateral margins of abdomen, stems of halteres, bases of the femora, tibiæ and tarsi, ovipositor of female and inner portion of male hypopygium, yellow. Head and body gray pruinose, unmarked. Antennæ reaching to base of wings, rather robust, the second joint less than twice as long as wide, the fourth slightly wider than long, the following joints becoming successively longer than wide. Wings aborted, slightly shorter than the halteres, yellow on the basal half, the remainder chiefly brown. Halteres considerably elongated. Male claspers consist of a fleshy basal piece, to the inner side of which is attached a three-pronged, chitinous process. Ovipositor of female of nearly a uniform width, curved toward the apex, the latter bluntly rounded.

Length 11 mm. A specimen of each sex collected June 28. Type No. 9033, U. S. National Museum.

October, 1905.

CENTRAL TEXAS COLEOPTERA.

BY W. KNAUS, MC PHERSON, KANSAS.

The last week in May, 1904, the writer spent on a collecting trip for Coleoptera in Central Texas. The places collected at were Ft. Worth, or more properly speaking, Station 6, five miles east of the city, on the electric line to Dallas, May 23; Granbury, on the Brazos River, May 24; Brownwood, on Pecan Bayou, May 25–26; Winchell, on the Colorado River, May 26–27; Brady, on Brady Creek, May 27; and Camp San Saba, on San Saba River, two hundred miles south-west of Ft. Worth, on May 27–28. This part of Texas was suffering for want of rain at the time of my visit, but results were fairly satisfactory, as one hundred and forty seven species were taken, as the list following shows.

Identifications of the species not readily recognized were made by Mr. H. C. Fall, of Pasadena, Calif.; Mr. H. F. Wickham, of Iowa City, Iowa, and Mr. C. Schaeffer, of Brooklyn, N. Y.

The bred specimens referred to in the list were from Mesquite wood, procured at Brownwood. No specimens emerged until the latter part of August.

14a Cicindela Belfragei, Salle; one specimen at Brownwood and one at Winchell.

38 Cicindela rectilatera, Chd., Granbury and Winchell, on moist mud near water.

40 Cicindela punctulata, Fab.; Station 6.

218 Pasimachus punctulatus, Hald.; a few specimens at Granbury.

219 Pasimachus Californicus, Chd.; several specimens at Brownwood.

265 Clivina pallida, Say; at Granbury, two specimens.

283 Schizogenius lineolatus, Say; not common at Brady.

Schizogenius, species between depressus, Lec., and amphibius, Hald.; several specimens at Brady.

292 Ardistomis viridis, Say; Brownwood, common.

388 Bembidium intermedium, Kirby; common at Brownwood.

391 Bembidium versicolor, Lec.; Brady and Brownwood, not common.

421 Bembidium laevigatum, Say, Granbury; several specimens.

463 Tachys nebulosus, Chd., Camp San Saba and Brady; several specimens near water's edge.

742 Calathus gregarius, Say; Station 6.

772 Platynus extensicollis, Say; Camp San Saba, common.

849 Galerita atripes, Lec.; Brady and Camp San Saba, a few specimens.

876 Tetragonoderus fasciatus, Hald.; Camp San Saba, two specimens under stones at water's edge.
939 Cymindis laticollis, Say ; Station 6, four specimens.
961 Helluomorpha ferruginea, Lec.; Winchell, six specimens under decaying wood.
1000 Chlænius laticollis, Say ; Camp San Saba.
1007 Chlænius prasinus, Dej.; Granbury, a few specimens.
1008 Chlænius leucoscelis, Chev.; Camp San Saba, common.
1012 Chlænius vafer, Lec.; Camp San Saba, two specimens.
1014 Chlænius Nebraskensis, Lec.; Camp San Saba, a few specimens.
1021 Chlænius Pennsylvanicus, Say ; Station 6, one specimen.
1045 Oodes cupræus, Chd.; Brownwood, on moist mud, near the water's edge.
1062 Agonoderus partiarius, Say ; Brady, two specimens.
1067 Discoderus parallelus, Hald.; Brady, common.
1083 Harpalus caliginosus, Fab.; Station 6, common.
1087 Harpalus Pennsylvanicus, DeG.; Camp San Saba, common.
1125 Selenophorus pedicularius, Dej.; Brady, three specimens.
1327 Hydroporus dimidiatus, G. & H.; Brady, common.
1502 Cybister fimbriolatus, Say ; Brady, three specimens.
1576 Ochthebius fasciatus, Lec.; Brady, one specimen.
1592 Tropisternus Californicus, Lec.; Brady, three specimens.
Berosus, species ; Brady, two specimens.
1617 Chætarthria atra, Lec.; Brady, one specimen.
1626 Philhydrus nebulosus, Say ; Brady, several specimens.
1639 Helochares maculicollis, Muls.; Brady, one specimen.
9318 Cymbiodyta morata, Lec.; Brady, two specimens.
1672 Cercyon melanocephalum, Linn.; Camp San Saba, several specimens.
1698 Necrophorus marginatus, Fab.; Station 6.
1708 Silpha inæqualis, Fab.; Station 6.
2167 Philonthus hepaticus, Er.; Brownwood, common.
2170 Philonthus flavolimbatus, Er.; Brownwood, two specimens.
2182 Philonthus alumnus, Er.; Brownwood, two specimens.
2231 Philonthus viridanus, Horn ; Brownwood, two specimens.
2251 Actobius pæderoides, Lec.; Brownwood and Brady, common.
2255 Actobius terminalis, Lec.; Brownwood, one specimen.
2278 Xantholinus pusillus, Sachse ; Brownwood, two specimens.
Trogophlœus, three species ; Brownwood and Brady.

2305 Stenus renifer, Lec.; Brownwood, Brady and Camp San Saba, common.

2376 Stenus colonus, Er.; Camp San Saba, three specimens.

Stenus species near callosus, Er.; Camp San Saba, two specimens.

2508 Cryptobium sellatum, Lec.; Camp San Saba, two specimens.

2782 Apocellus sphæricollis, Say; Brady, one specimen. All the above Staphylinids were taken on moist mud near pools.

Psyllobora obsoleta, Cas.; Camp San Saba, one specimen.

3084 Exochomus contristatus, Muls.; Station 6.

Exochomus latiusculus, Cas.; Camp San Saba, one specimen.

3095 Brachyacantha ursina, Fab.; Station 6.

3149 Scymnus caudalis, Lec.; Camp San Saba, one specimen.

3206 Languria læta, Lec.; Brownwood, common.

3219 Ischyrus 4-punctatus, Oliv.; Granbury, common on fungus.

3229 Tritoma atriventris, Lec.; Brownwood.

3344 Lathropus vernalis, Lec.; Brownwood, several specimens bred from Mesquite.

3418 Dermestes marmoratus, Say; Winchell, one specimen.

3490 Hister abbraviatus, Fab.; Winchell, two specimens.

3494 Hister depurator, Say; Brady, two specimens.

3515 Hister subrotundus, Say; Winchell, one specimen.

3610 Saprinus fimbriatus, Lec.; Granbury and Brady, several specimens.

9977 Teretrius levatus, Horn; twelve specimens, Brownwood, in larval burrows in mesquite.

3673 Carpophilus pallipennis, Say; Station 6 and Winchell, common in Opuntia flowers.

3673 Var. floralis, Er.; Winchell, common.

3689 Colastus truncatus, Rand.; Winchell, one specimen.

3917 Lutrochus luteus, Lec.; Camp San Saba, common, on stones in river.

3924 Helichus suturalis, Lec.; Camp San Saba, common, on underside of stones in river.

Elmis, two new species; Camp San Saba, under stones in river, one specimen; common.

3951 Stenelmis vittipennis, Zim.; Camp San Saba, common, under stones in river.

Stenelmis, two new species; Camp San Saba, under stones in water.

3970 Heterocerus undatus, Melsh.; Brady, one specimen.

4092 Alaus lusciosus, Hope; Brownwood, one specimen.

4251 Drasterius asper, Lec.; Winchell, one specimen.

4573 Chalcophora campestris, Say; Brownwood, one specimen, very large.

4699 Acmæodera pulchella, Hbst.; Winchell, on Opuntia flowers
Acmæodera neglecta, Fall; Winchell, common, on Opuntia flowers.

4872 Chauliognathus scutellaris, Lec.; Winchell, common.

5004 Collops 4–maculatus, Fab.; Winchell.

5038 Anthocomus Erichsonii, Lec.; Winchell, common, on Opuntia flowers.

5109 Listrus senilis, Lec.; Winchell, several specimens.

5111 Dasytellus nigricorne, Bland.; six specimens at Winchell.

5127 Elasmocerus terminatus, Say; Brownwood, bred from Mesquite; larvæ in white part of wood.

5342 Sinoxylon Texanum, Horn; Brownwood, bred from Mesquite; perfect insects, tunneling vertically into wood.

5377 Trogoxylon Californicum, Cr.; Brownwood, bred from Mesquite; larvæ in white part of wood, emerged from August to December, very common.

5435 Canthon lævis, Drury; Brownwood, Camp San Saba and Winchell.

5442 Choeridium Lecontei, Har.; Brady, two specimens.

5451 Phanæus difformis, Lec.; Granbury, one male and one female.

5453 Phanæus triangularis, Say; Camp San Saba, one female.

5458 Onthophagus hecate, Panz.; Winchell, common.

5463 Onthophagus Pennsylvanicus, Har.; Winchell, common.

10208 Aphodius tenuistriatus, Horn.; Station 6.

5738 Lachnosterna cribrosa, Lec.; Brownwood and Winchell.
Lachnosterna, new species, Station 6, one male, two females, under stones, near scrub oaks; species near corossa, Lec.

5842 Strigoderma arboricola, Fab.; Brownwood, common.

5869 Ligyrus gibbosus, De G.; Brownwood and Winchell, common.

5892 Phileurus cribrosus, Lec.; Brownwood, one specimen in Mesquite stump.

5901 Euphoria Kernii, Hald; Winchell, several specimens and a black var.

5938 Trichius Texanus, Horn; Winchell, two specimens.

6141 Batyle suturalis, Say; Winchell and Brady.

6169 Cyllene crinicornis, Chev.; Brownwood, several specimens bred from Mesquite, emerged from wood, Sept., Oct. Apparently the most common species boring in Mesquite.

6492 Mecas pergrata, Say ; Winchell, one specimen.

6580 Anomoea mutabilis, Lec.; Winchell, one specimen.
Pachybrachys, species, Camp San Saba, several specimens.

6707 Diachus auratus, Fab.; Camp San Saba, two specimens.

6775 Colaspis prætexta, Say ; Brownwood.

6971 Graptodera foliacea, Lec.; Camp San Saba, common.

7020 Aphthona Texana, Cr.; Station 6, one specimen.

7080 Odontota rubra, Web.; Station 6, two specimens.

7320 Eleodes tricostata, Say ; Brownwood.

7391*a* Nyctobates barbata, Knoch.; Station 6, one specimen.

7433 Blapstinus dilatatus, Lec.; Station 6.

7438 Blapstinus pratensis, Lec.; Brady, two specimens.

7510 Platydema excavatum, Say ; Granbury, common on fungus.

7550 Helops impolitus, Lec.; Winchell, one specimen.

7573 Helops farctus, Lec.; Winchell, one specimen.

7679 Eustrophus bicolor, Say ; Granbury, common on fungus.

7739 Oxacis cana, Lec.; Camp San Saba, four specimens.

7780 Mordella scutellaris, Fab ; Brownwood.

7847 Mordellistena marginalis, Say ; Camp San Saba, Winchell, several specimens.

7915 Macratria murina, Fab.; Camp San Saba, one specimen.

7922 Notoxus calcaratus, Horn.; Camp San Saba, one specimen.
Nemognatha, new species, Winchell, not uncommon.

8045 Gnathium Texanum, Horn.; Camp San Saba, one specimen.

8068 Macrobasis immaculata, Say ; Winchell, two specimens.

8079 Epicauta trichrus, Pall.; Winchell, two specimens.

8083 Epicauta sericans, Lec.; Winchell, several specimens.

8140 Cantharis fulvipennis, Lec.; Brownwood and Camp San Saba.

8491 Lixus silvius, Boh.; Camp San Saba, three specimens.
Smicronyx species, Camp San Saba.

8681 Macrorhoptus estriatus, Lec.; Camp San Saba, one specimen.

8760 Acalles porosus, Lec.; Winchell.

11055 Tychius subfasciatus, Var.; Casey, Camp San Saba, one specimen.

9221 Cratoparis lunatus, Fab.; Station 6.

9227 Brachytarsus vestitus, Lec.; Winchell, common.

THE INFLUENCE OF THE APIDÆ UPON THE GEOGRAPHICAL DISTRIBUTION OF CERTAIN FLORAL TYPES.

BY J. ARTHUR HARRIS, ST. LOUIS, MO.

The reciprocal relations of flowers and insects form a subject which has attracted many workers since Darwin and others showed the importance of this phase of biology. In the whole field of adaptation we have no better materials than those afforded by the morphology of flowers and insects considered in their relation to each other. The field has been most exploited by botanists, but some entomologists have also made valuable contributions to the literature of this subject, and their assistance has always been necessary for the identification of visitors observed.

Ecology, the phase of biology which considers the animal or plant in its relation to its environmental conditions, has been much pursued of recent years. One of the oldest phases, and one which at the present time, it seems to me, is not receiving the attention which it should, is that concerned with the mutual adaptations of flowers and insects.

The researches of Darwin early showed the importance of the classic studies of Koelreuter, Sprengel and Knight, and other workers immediately seized his ideas and proceeded to verify and elaborate them by observation, experiment and comparison. The tracing of the development of the various conceptions concerning the relations of flowers and insects during this most important period in the history of biology is a most fascinating exercise, but one which is quite out of place in this paper. Here we are concerned only with the problem of the influence of the insects upon the geographical distribution of the flora, and we shall make no attempt to go back beyond the classic work of Hermann Müller on Alpine flowers and their fertilization by insects.

The basis of the floral theory of Müller, as developed in the third portion of his Alpenblumen, is the proposition of the beneficial effect of crossing; so often as the progeny of cross-fertilization comes into competition for existence with the offspring of self-fertilization, it wins in the contest; only when the struggle for existence is absent may self-fertilization suffice for long-continued propagation. The supporting evidence for this thesis is two-fold: the direct proof of the extensive cultural experiments of Darwin and the indirect evidence yielded by the organization of flowers themselves.

While the importance of cross-fertilization has doubtless been overestimated by many writers, it hardly need be stated in this place that at the present time no argument need be advanced in its support. Admitting

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that cross-fertilization is advantageous to the species, and that as a consequence close adaptations to certain agents well fitted to effect cross-fertilization have been evolved, it becomes at once evident that there will be an intimate correlation between the distribution of the plant and the agent upon which it depends for fertilization. This fact was recognized many years ago, and numerous attempts have been made to determine the effect of the insect fauna upon the constitution of the flora. Several of these investigations, especially those employing the statistical methods developed by Müller, have yielded results of great interest.

This phase of ecology is clearly one which demands for its complete development the co-operation of students of both sciences, and it is the purpose of the present paper to present briefly some results which seem to the writer to indicate the interdependence of certain phases of floral ecology and entomology and the importance both to botany and zoology of their investigation.

Some years ago, while studying the floral ecology of *Solanum* and *Cassia*, the writer was much impressed by the similarity of the floral structure of these systematically widely-separated genera and the identity of their ecological relations. Both genera are characterized by a widely-open perianth, elongate anthers basifixed on short filaments and opening by apical pores and usually connivent around a filiform style, terminating in a punctiform stigma. Upon examining the systematic literature it was found that forms in which the anthers open by apical pores, instead of the more common longitudinal slits, are characterized by stamens and perianth of the same form as those of these two genera. Certain genera from such systematically widely-separated families as the Liliaceæ, Pontederiaceæ, Commelinaceæ, Pittosporaceæ, Leguminosæ, Tremandraceæ, Solanaceæ and Rubiaceæ, and genera from some other groups, have a floral structure conforming in a remarkable degree to that exemplified by the familiar *Solanum* and *Cassia*. The floral structure in these families exhibits a wide range of form, and the close resemblance of these representatives, amounting to an almost identical habit, suggested the interest of a further investigation which might furnish some clue to the real nature of the parallelism. *Solanum* and *Cassia* are known to be adapted to pollen-collecting bees, and as the material and literature were examined the evidence that all the forms are adapted to fertilization by bees became quite considerable. It was also observed that these apically dehiscent forms seemed to be more abundantly represented in some regions than in others.

The parallelism of structure, the apparent identity of ecological relationship and the suggestion of some peculiarities of geographical distribution seemed to justify the extensive investigations necessary for the elaboration of the problem.

The final treatment of the various phases of the problem is not yet ready for publication, but quite a full discussion appears in the Sixteenth Annual Report of the Missouri Botanical Garden. It is the purpose of the present note to direct the attention of entomologists to a phase of ecology and biogeography, which is of interest to both botanists and zoologists, and requires the co-operation of both groups of workers.

The plant forms to be considered were limited to those in which the anthers open by terminal pores instead of the more general longitudinal slits. Detailed structural comparisons have shown that flowers with apically dehiscent anthers may be divided upon structural grounds into seven groups. Like most categories of classification, these groups are not sharply defined, but in some degree transgressive. The distinction between dehiscence by pores and by longitudinal splits and between the several types recognized is not an absolute one. The number of apically dehiscent genera or species might be increased or decreased by including forms in which the lateral slits first open more widely at the tip, or excluding all those in which the pores are finally supplemented by lateral slits. The number of genera as limited is, the writer feels confident, approximately right so far as may be determined from systematic literature and the examination of herbarium material. The groups, too, cannot be separated by sharp characters, but the questionable forms are but few as compared with those which do fall clearly into one of the recognized classes.

The classes recognized have been designated as the Araceous, Gramineous, Polygalaceous, Ericaceous, Dilleniaceous, Solanum-Cassia and Melastomataceous types. The first three of these represent well-defined groups, which are quite foreign to our present consideration. The Ericaceous type is not so sharply limited, and perhaps includes some forms which should have been placed in one of the other types. The Dilleniaceous, Solanum-Cassia and Melastomataceous types are the ones to which especial attention has been given.

The Dilleniaceous type has both whorls of the perianth usually developed, but one or both sometimes reduced, usually campanulate or rotate in disposition; *stamens indefinite in number*; filaments long or

short, free or variously united; *anthers mostly elongate, basifixed;* flowers usually actinomorphic throughout, but androecium sometimes zygomorphic; gynoecium of distinct or variously united carpels; flowers generally highly coloured and conspicuous.

To the Dilleniaceous type have been assigned five genera of the Dilleniaceæ, five of the Elæocarpaceæ, three of the Ochnaceæ, and one each of the Theaceæ, Bixaceæ and Flacourtiaceæ. With the possible exception of the Ericaceous type, it shows the widest range of form of any group recognized; furthermore, it is the best known ecologically, and it is quite possible, or even probable, that its members are adapted to very different modes of pollination.

The Solanum-Cassia type may be characterized as follows: Perianth usually quite large, mostly actinomorphic, segments campanulate or *more generally patent or reflexed* in disposition; androecium of few members, usually 5 or 10, very rarely as many as 15, staminodia sometimes present, as reduced members of these numbers in zygomorphic forms, or more rarely from a multi-staminate androecium; filaments *much reduced in in length;* anthers basifixed, oblong to sagittate or linear, often more or less connivent around the filiform style with its small, generally simple stigma, or at least erect, very rarely distant; flowers generally conspicuous and highly coloured.

The members of this type show a remarkable uniformity of structure. To it have been assigned 49 genera, as follows: *Mayaca* (Mayacaceæ), *Schœnocephalium, Stegolepes, Rapatea, Saxo-Fridericia, Cephalostemon, Spathanthus* (Rapateaceæ), *Cartonema, Dichorisandra* (Commelinaceæ), *Monochoria* (Pontederiaceæ), *Walleria, Agrostocrinum, Dianella, Calectasia, Luzuriaga* (Liliaceæ), *Conanthera, Cyanella, Zephyra, Tecophilæa* (Amaryllidaceæ), *Cheiranthera* (Pittosporaceæ), *Cassia, Koompassia, Distemonanthus, Labichea, Dicorynia, Baudouinia, Duparquetia, Krameria, Martiusia* (Leguminosæ), *Platytheca, Tetratheca, Tremandra* (Tremandraceæ), *Thomasia, Guichenatia, Lysiosepalum, Lasiopetalum* (Sterculiaceæ), *Ouratea, Brackenridgea, Godoya, Elvasia, Blastemonanthus, Wallacea, Schuurmansia, Pœcilandra, Luxembergia, Euthemis, Leitgebia* (Ochnaceæ), *Stemonoporus, Monoporandra* (Dipterocarpaceæ), *Kiggelaria* (Flacourtiaceæ), *Begonia,* sections Solanthera and Parvibegonia (Begoniaceæ), *Ardisia,* sections Icacorea, Stylogyne and Monoporus (Myrsinaceæ), *Gardneria* (Loganiaceæ), *Exacum, Cotylanthera* (Gentianaceæ), *Solanum, Cyphomandra* (Solanaceæ), *Argostemma* and *Strumpfia* (Rubiaceæ).

The Melastomataceous type includes, besides the Melastomataceæ, only *Storckiella* of Leguminosæ and *Maximilianea* and *Amoreuxia* of the Bixaceæ.

In this type there is the same conspicuous, patent corolla and elongate, basifixed anthers as in the Solanum-Cassia type. Dehiscence by pores seems to be more specialized, since, in nearly all the forms, the anthers open by a single and usually minute terminal pore instead of two, as is commonly the case in other groups. The essential difference between this and the Solanum-Cassia type is the elongate filaments. These make possible the highly-organized anther of the Melastomataceæ. To this class belong clearly all of the 161 genera of the Melastomataceæ, except 12, in which the anthers open by more or less longitudinal slits.

A few genera in which the anthers exhibit more or less terminal poriform openings do not fall into any of the seven classes recognized. Our knowledge of these forms is not sufficient to justify establishing special classes for them or placing them in any of the groups already recognized. They have simply been designated as aberrant forms and like the first four classes, left out of consideration in the distributional tabulations.

(To be continued).

NOTES ON NEW PHILIPPINE HYMENOPTERA.

BY ROBERT E. BROWN, S. J., MANILA OBSERVATORY.

Dr. W. H. Ashmead, of the National Museum, Washington, D. C., has published from time to time in the CANADIAN ENTOMOLOGIST descriptions of new genera and new species of Hymenoptera from the Philippine Islands. As the great majority of these new insects were either collected or bred in the garden attached to the Manila Observatory, perhaps the life-histories of some of them will not be without interest and value.

Microplitis Philippinensis, sp. n., Ashm. Fam. Braconidæ.—Bred in the Manila Observatory. This hymenopteron was bred for the first time from the larva of the Sphinx moth, *Chærocampa oldanlandiæ*, Fab., but later on it was bred from three other species of Sphinx, viz.: *Metopsilus acteus*, Cram., *Chærocampa celerio*, Linn., and *Panacra mydon*, Walker. It would appear from many observations that the parasite only attacks the larvæ in their earlier stages, for we have never found a full-grown Sphinx larva parasitized by *M. Philippinensis*. When the

larval parasite is full-grown it eats its way out through one of the anterior segments of its host and proceeds to spin its cocoon. The cocoon is fastened by one end to the body of the caterpillar at a small distance from the place of emergence. The cocoon itself is an elongated oval of yellowish-white silk, about 6 mm. in length, and is fastened to the leaf underneath the body of the larva by a stout strand of silk, which thus also secures the caterpillar to the leaf and prevents its moving. In about a week the adult *M. Philippinensis* cuts a neat round hole from the top of the cocoon and escapes. Dr. Ashmead's description is as follows: Length, 4.5 mm. Black; face in front finely, closely punctate, opaque, the thorax above shining, but minutely punctured, the metathorax very coarsely reticulated with a sharp median carina; palpi yellowish; legs black or fuscous, the front femora at apex and beneath their tibiæ and tarsi, and other legs from tip of femora are yellowish; the hind tibiæ are very stout, and are more or less brownish or reddish outwardly from the middle to near the base. Wings with the apical third fuscous, the basal two-thirds subhyaline, the stigma and veins black.

Nesolynx flavipes, new genus, new species, Ashm.—Bred in the Observatory Garden. This minute hymenopteron is a parasite of the above-mentioned insect, *M. Philippinensis*. On one occasion, when the latter had spun its cocoon on the back of a Sphinx larva, we noticed that a number of small black hymenoptera were hovering round the caterpillar, and as several seemed to alight on the cocoon itself we caught a few, and collected the cocoon and placed it in a test tube with a wad of cotton as a stopper. *M. Philippinensis* ought to have emerged at the end of the week, but nothing appeared even at the end of two weeks. After three weeks, however, that is three weeks after having observed the small Hymenoptera alight on the cocoon, 32 *Nelsolynx flavipes* emerged, and on examining them they were seen to be of the same species as the Hymenoptera previously seen. As the *N. flavipes* were probably laying their eggs when first obtained and observed, it would show that the whole life cycle of the insects is completed in three weeks.

Kradibia Brownii, sp. n., Ashm. Fam. Agaonidæ.—Bred in the Observatory Garden.

Sycoryctes Philippinensis, sp. n., Ashm. Fam. Torymidæ. Sub-Fam. Idarninæ.—Bred in the Observatory Garden. Both of these insects were obtained from the same fig tree, viz.: *Ficus heterophylla*, Linn., or *Ficus aspera*, Forst. The Kradibia is the ordinary fig wasp, while the

Sycoryctes is a parasitic fig insect. These insects are interesting, inasmuch as they are the first fig insects to be discovered in the Philippine Islands.

Œncyrtus papilionis, sp. n., Ashm. Fam. Encyrtidæ.—Bred in the Observatory Garden This species was bred from the eggs of three distinct species of Papilios, viz.: *P. alpenor*, Cram.; *P. agamemnon*, Linn., and *P. rumanzovia*, Esch. As many as five and six *O. papilionis* were bred from each egg. We do not know the exact period.

Charops papilionis, sp. n. Fam. Ichneumonidæ. Sub-Fam Ophioninæ.—Bred in the Observatory Garden. This comparatively large species (length, 10.5 mm.) was bred from the larva of *Papilio agamemnon*, Linn. The egg was laid in the body of the larva after the second moult, and the caterpillar moulted a third time and was preparing to moult for the fourth time when the parasite reached the vital organs and killed it. When the *O. papilionis* emerged it left the shell of the larva perfectly empty.

NEW SPECIES OF CULICIDÆ.

BY JOHN A. GROSSBECK, NEW BRUNSWICK, N. J.

The following new species of mosquitoes have been found in New Jersey during the present summer (1905) in the course of the investigation conducted by Dr. John B. Smith.

Culex pallidohirta, sp. nov. ♀.—Head brown, occiput clothed with yellowish scales and a few dark brown ones intermixed; antennæ brown, the basal joint and basal half of following one dirty yellow; proboscis brown, with whitish scales scattered over the surface save at the apical fourth; palpi brown, tipped with silvery white, four jointed, apical joint minute, flattened, spiny. Mesonotum covered with pale brown scales and with a narrow median furrow obsolete on posterior portion, bounded on each side by scales of a slightly darker colour; a lateral line of pale yellow scales beginning near the posterior margin and extending to the middle of the lateral margin of the mesonotum also encloses these darker scales; scutellum pale brown with creamy-yellow bristles on the posterior margin; metanotum evenly pale brown; pleura yellowish-brown with patches of whitish scales; halteres dirty white. Abdomen creamy with a metallic silvery-gray lustre in life, somewhat darker with grayish shadings in pinned specimens; genitalia dark brown. Legs cream coloured, the anterior part of all femora and also anterior part of tibia of fore leg brownish; the apical two or three joints of fore and mid tarsi

also brownish; claws all uniserrated; wings hyaline with slender brown scales and broad whitish ones, petiole of first sub-marginal cell about half the length of this cell. Length 4.5–5 mm.

Types, 2 females in the New Jersey Experiment Station collection. This species is at once recognizable by its silvery lustre and cream-coloured legs.

A single specimen of this species hatched May 5th out of a lot of larvæ and pupæ sent in by Mr. Brehme, who collected them as *Culex Canadensis* from the Orange Mountains. The remaining larvæ were immediately put into alcohol and the pupæ left to develop; but all *Canadensis* emerged from the pupæ and no larvæ distinguishable from that species could be found. Another collection in the same locality was made several days after the first and from this lot another female hatched May 26th. Of the numerous other larvæ with which they were associated all were *Canadensis* and one *Corethra cinctipes*. We had evidently gotten hold of the tail end of the brood; no larvæ remaining.

Culex saxatilis, sp. nov. ♀.—Head brown, occiput covered with yellowish white scales and some dark brown ones; antennæ and proboscis dark brown, the former with scattered whitish scales; palpi brown, apparently three jointed, the fourth being minute, pointed and wholly retracted within the third joint. Mesonotum clothed with rich brown scales and pale yellowish ones at the margins; two naked lines extend down the anterior part and two pale yellowish spots are on the centre of the dorsum which become more or less diffused posteriorly; scutellum brown with yellowish scales and long black bristles on the posterior margin; metanotum grayish brown; pleura light brown with small patches of dirty white scales; halteres yellowish. Abdomen dark brown, all segments with apical white bands which become broad laterally, till, beneath, it is white with dark brown basal corners. Legs black, coxæ, base and under side of femora and a small spot at the knee creamy; claws simple; wings hyaline, the scales brown, petiole of first sub-marginal cell about one-third the length of this cell. Length 4.7–5 mm.

Types, six females in the New Jersey Experiment Station collection. Distinguished from *Culex territans*, its nearest American ally, by its large size, dark colour, broadly banded abdomen and spotted thorax.

Pupæ of *Culex saxatilis* were found August 31st on Garret Mountain (Paterson), in a rock-bottomed pool, associated with larvæ and pupæ of *C. pipiens*. In the afternoon of the same day two females emerged together with several *pipiens*. Sept. 1st, 5 others, all females, hatched with more *pipiens*. Later emergences were all *pipiens*. As in the preceding species the last of the brood was collected in the pupal stage; no larvæ remaining.

MISCELLANEOUS NOTES.

BY T. D. A. COCKERELL, BOULDER, COLO.

Genera of Diptera.

Some of the generic names used for Scatophagidæ will stand or fall according to one's notion of homonymy. Becker, in 1894, proposed the name *Orthacheta* (cf. Index Zoologicus); Aldrich, in the interest of orthography, has altered this (Cat. N. A. Diptera) to *Orthochæta*. Now, Germar long ago used *Orthochætes* for a beetle, while Cossmann, in 1890, used *Orthochetus* for a mollusc. I do not pretend to say what ought to be done with such a mix-up; it comes back to the old question, whether an error in spelling (which may hypothetically be attributed to the printer) must be maintained; and again, if not, whether the differences in the termination suffice to prevent homonymy. To the last question I should answer yes, and so retain the fly, mollusc and beetle names.

In the same year Becker named another Scatophagid genus *Megaphthalma*, and Aldrich (l. c) alters this to *Megophthalma*. Is this to be held invalid because of the earlier *Megophthalmus*, Curtis?

Aldrich credits *Pogonota* and *Okenia* to Becker. It is *Pogonota*, Zett., 1846 (*Okenia*, Zett., 1840, preoccupied).

In the Blepharoceridæ, Kellogg has a genus *Philorus*. Is this a homonym of *Philoros*, Walker, 1854, a word with the same derivation, applied to a valid genus of moths?

In Anthomyidæ, *Tetrachæta*, Stein, Berl. Ent. Zeits., 1898, p. 254, is a homonym of *Tetrachæta*, Ehrenb. The Dipterous genus may be called *Parasteinia*, n. n., type *Parasteinia unica* (*Tetrachæta unica*, Stein.)

There are several other homonymous generic names in our list of Diptera; the attention of their authors has been called to them, and it is hoped that substitutes will be provided.

Some Noctuid Moths.

Euxoa brunneigera, Grote.—Hampson remarks (Cat. Lep. Phal. IV., 270) that "the form from Colorado is paler and grayer brown, the markings of fore wing sometimes obsolescent, the hind wing paler towards base." I think this Colorado insect is a valid subspecies, which may be termed *E. brunneigera Masoni*. The specimen before me is from Mr. J. Mason's collection, and is from Glenwood Springs, Colorado. I compared it with the excellent series of true *brunneigera* in the National Museum, and found that it differed by the lighter and redder colour, the *broader primaries*, and the much fainter median band. *E. citricolor*, Grote, also occurs at Glenwood Springs (Mason collection).

Acontia neomexicana, Smith, notwithstanding the name, was not described from New Mexico. Fortunately the name is justified by a specimen in the National Museum, collected by myself at Las Cruces, N. M,, in April.

Cinophanus Dyari, Ckll.—Described from New Mexico, is also found in the Huachuca Mts., Arizona. (In coll. U. S. National Museum.)

Two Parasitic Hymenoptera.

I have recently described two parasitic species, basing my conclusions as to their distinctness on published descriptions. I gave the types to the National Museum, and when recently in Washington took occasion to compare them with their nearest allies.

Proctotrypes Coloradicus, Ckll., is darker and rather more robust than *P. pallidus*, Say. Dr. Ashmead thinks it is a form of *pallidus*, and this is very likely the case. I will take the opportunity to record that *P. rufigaster*, Prov. (det. Ashm.), was collected by myself at Monument Rock, Santa Fé Canon, New Mexico. This is the first record of the genus from New Mexico.

Porizon Vierecki, Ckll., differs from the allied *hyalinipennis*, Cress., (type compared) by the white veins of the wings, and especially by the much more slender hind femora. *P. hyalinipennis* has thick femora in both sexes.

A NEW DEXIID PARASITE OF A CUBAN BEETLE.

BY D. W. COQUILLETT, WASHINGTON, D. C.

Thelairodes ischyri, new species.

Black, the antennæ, palpi, labella and front corners of the first two abdominal segments pale yellow, the last segment and hind edge of the preceding orange yellow. Front at narrowest part one-fifth as wide as either eye, the upper three pairs of frontal bristles much larger than the others, one pair beneath insertion of antennæ, facial ridges strongly diverging below, antennæ slender, almost as long as the face, the third joint five times as long as the second. Mesonotum gray pruinose, a broad fascia behind the suture, and four vittæ in front of it black, three postsutural and two sternopleural bristles. Abdomen bearing marginal bristles on the last three segments, and with a discal row on the last one ; abdomen polished, the last three segments narrowly whitish pruinose on their bases. Pulvilli much shorter than the last tarsal joint. Wings hyaline. Length, 6 mm.

A male specimen bred from the beetle, *Ischyrus flavitarsis*, Lec., in April, at Santiago de las Vegas, Cuba, by Dr. George Dimmock. Type No. 8458, U. S. National Museum.

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CÆNOCEPHUS IN AMERICA.

BY J. CHESTER BRADLEY, ITHACA, N. Y.

Heretofore the genus *Cænocephus*, Konow, has been known only from Siberia, and by a single species. Two undescribed species from western United States occur in Dr. Alex. D. MacGillivray's collection (Cornell University), one of them also in the collection of the American Entomological Society, and at the request of Dr. MacGillivray I here describe them.

Length 11 mm; wings slightly tinged with yellow; second and third abdominal segments in part red.....*Konowi*, n. sp.

Length 16 mm; wings somewhat smoky; second, third and fourth abdominal segments entirely red*Aldrichi*, n. sp.

Cœnocephus Aldrichi, n. sp.—Black; legs except coxæ and trochanters, abdominal segments two, three and four red; wings somewhat smoky. Length 16 mm.

Antennæ almost filiform, slightly thickened mesally, the first segment of the flagellum slightly exceeding the second. Head minutely punctured above. Pronotum subquadrate, deeply notched posteriorly. Wings somewhat smoky, the hind wings without a cubital cell. Posterior trochanters and the rest of the legs except the coxæ red; no spines on the posterior tibiæ. Abdomen rather long, black, the second, third and fourth segments entirely red.

Habitat—Juliaetta, Idaho. Type in the collection of Cornell University.

I take pleasure in dedicating this large and beautiful species to the collector, Prof. J. M. Aldrich.

Cœnocephus Konowi, n. sp.—Black, legs and a band near the base of the abdomen red; wings stained yellow. Length 11 mm.

Head black; clypeus somewhat prolonged and almost truncate, slightly triserrate; mandibles deeply toothed, yellow; occiput very minutely punctured, polished, covered with very minute black pubescence; flagellum black, eighteen segmented, very slightly thickened mesally, first segment somewhat longer than the second. Pronotum quadrate, shining as in the rest of the trunk. Wings stained slightly yellow; posterior ones without a complete cubital cell. Legs red, or the coxæ and fore and middle trochanters black; no spurs on the tibiæ before the apex. Abdo-

men black, second and most of the third segment reddish yellow, or in one paratype the second and third segments red, the apex of each black in the middle.

Habitat—Washington; Moscow, Idaho (Prof. J. M. Aldrich). Type and one paratype in the collection of the American Entomological Society and one paratype in the collection of Cornell University.

I dedicate this species by permission to Rev. Fr. W. Konow, whose work on the Phytophagous Hymenoptera stands alone.

A REMARKABLE FLIGHT OF *CORISA*, "WATER BOATMEN."

BY D. LANGE, ST. PAUL, MINN.

Between 2 and 3 o'clock on the afternoon of Oct. 11, 1904, I observed a remarkable flight of "Water Boatmen" at St. Paul, Minn. Thousands of them were flying hither and thither over several asphalt-paved streets, which had just been watered, and on which the sun was shining; the temperature was about 60° F. in the shade, the sky was clear, and there was no wind. The insects evidently mistook the wet asphalt for water. Thousands of them alighted, and were held fast by the film of mud until they died. About 5 o'clock I noticed on one street a struggling "Boatman" to every square inch of surface.

Have these insects regular autumn swarming days like ants, or do they migrate from one body of water to another in search of favourable winter quarters? The lakes and ponds about the city were full of water, and therefore this general flight was not caused by any scarcity of the element. Prof. F. L. Washburn, who identified the insects for me, found that there were ten to twenty males to one female, and I did not see any of them mating. These insects are frequently attracted to the electric lamps at night, but I never before found them flying in the daytime.

A few individuals of Corisa and a number of "Whirligig beetles" were flying here during the afternoon of Oct. 28, the weather being fine and the temperature about 55°.

THE ANNUAL MEETING of the Entomological Society of Ontario will be held at the Ontario Agricultural College, Guelph, on Wednesday and Thursday, Oct. 18 and 19.

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ENTOMOLOGICAL SOCIETY OF ONTARIO.

The forty-second annual meeting of the Society was held, by kind invitation of President Creelman, at the Ontario Agricultural College, Guelph, on Wednesday and Thursday, October 18th and 19th. Owing to the unavoidable absence of Mr. John D. Evans, President of the Society, the chair was taken by the Vice-President, Dr. James Fletcher, Dominion Entomologist and Botanist, Ottawa. Among those present were: Rev. Dr. Fyles, Quebec; Mr. H. H. Lyman, Montreal; Mr. C. H. Young, Hurdman's Bridge; Mr. Arthur Gibson, Ottawa; Mr. C. C. James, Deputy Minister of Agriculture for Ontario, Messrs. J. B. Williams and C. W. Nash, Toronto; Mr. G. E. Fisher, Burlington; Rev. Dr. Bethune, London; President Creelman, Professors Lochhead, McCready, Sherman, Hutt, Reed, Messrs. Clew, Zavitz, Barlow, Jarvis, Hotson and others, Guelph. There were also present a large number of the young women students from the Macdonald Institute and of young men from the Agricultural College. At some of the meetings the attendance was over one hundred. The Society was also favoured with the presence of Prof. John B. Smith, State Entomologist of New Jersey, and a Professor in Rutger's College, one of our honorary members.

During the first morning a business meeting of the Council was held, at which the Treasurer's report was received and adopted. Application was made by a number of gentlemen belonging to the Agricultural College and the Wellington Field Naturalists' Club for the formation of a Guelph Branch of the Entomological Society of Ontario. The request was very heartily acceded to, and the Branch was inaugurated with an initial list of twenty-four members.

Professor T. D. A. Cockerell, of the University of Colorado, Boulder, Colo., an eminent entomologist, especially distinguished by his work in the Coccidæ and Hymenoptera, was unanimously elected an honorary member.

In the afternoon the reports of the Directors on the injurious insects of the year were read, and interesting discussions followed upon the

Tussock Moth, the Cottony Maple Scale, the Pea Weevil, the San José Scale and other insects of economic importance. A paper was also read by Prof. Sherman on "the Entomological Conditions in North Carolina."

In the evening a public meeting was held in the Massey Hall, and was largely attended by the members, students and visitors. President Creelman welcomed the Society to the Ontario Agricultural College, and gave an outline of the different departments of practical work in it and the affiliated Macdonald Institute. Mr. Barlow, of Guelph, also welcomed the Society on the part of the Wellington Field Naturalists' Club, of which he is President, and described the doings of the Club in the past and the investigations to be carried on in the future, the object being to make a complete survey of the fauna and flora of the County of Wellington. Dr. Fletcher, the Chairman, replied in happy terms, and then introduced Prof. John B. Smith, who gave an admirable and most interesting address on "What has been tried in New Jersey for the extermination of Mosquitoes." The lecture was illustrated with a large number of lantern slides, and in the course of it a very lucid explanation was given of the conveyance of malarial disease by the agency of mosquitoes. At the close a very hearty vote of thanks was given to Dr. Smith, proposed by Mr. C. C. James and seconded by Rev. Dr. Fyles.

During the second morning, Thursday, October 19th, papers were read on a variety of subjects by Dr. Fyles, Messrs. Gibson, Jarvis, Lyman, Stevenson and Zavitz, and were discussed by many of those present. In the afternoon the officers for the year 1905-6 were elected, and papers were read and addresses given by Mr. Evans, Prof. Sherman, Mr. Lyman, Dr. Fyles, Mr. J. B. Williams, Mr. Gibson, Dr. Fletcher, Mr. J. F. Smith, Prof. McCready, Prof. Lochhead, Dr. Bethune, Prof. Hutt, President Creelman, Mr. C. W. Nash, Mr. Clew. A cordial vote of thanks was given to President Creelman and the staff of the Agricultural College for their kindnsss and hospitality, and to the reporters of the Toronto *Globe* and the Guelph *Herald* and *Mercury* for their excellent accounts of the proceedings.

During the meetings a large number of rare and interesting specimens were exhibited by Prof. Sherman, Dr. Fletcher, Mr. Gibson, Dr. Fyles, Mr. Lyman, Mr. Jarvis, Mr. Zavitz, and a large case of most beautiful Micro-Lepidoptera, about 1,500 in number, by Mr. C. H. Young.

The following is the list of officers elected:

President—J. D. Evans, C. E., Trenton.
Vice-President—Dr. James Fletcher, Ottawa.
Secretary—W. E. Saunders, London.
Treasurer—J. A. Balkwill, London.
Directors : Division No. 1—C. H. Young, Hurdman's Bridge.
Division No. 2—C. E. Grant, Orillia.
Division No. 3—J. B. Williams, Toronto.
Division No. 4—G. E. Fisher, Burlington.
Division No. 5—Franklin Sherman, Guelph.
(The Ex-Presidents of the Society are Directors ex-officio.)
Librarian and Curator—Rev. C. J. S. Bethune, London.
Auditors—W. H. Hamilton and F. A. Stuart, London.
Editor of The "Canadian Entomologist"—Rev. Dr. Bethune, London.
Editing Committee—Dr. Fletcher, Ottawa; H. H. Lyman, Montreal; J. D. Evans, Trenton; Prof. Lochhead, Guelph; G. E. Fisher, Burlington; J. B. Williams and C. W. Nash, Toronto.
Delegate to the Royal Society—A. F. Winn, Montreal.
Delegates to the Western Fair—J. A. Balkwill and W. E. Saunders.
Finance Committee—J. Dearness, J. A. Balkwill and Dr. Bethune.
Library and Rooms Committee—Messrs. Balkwill, Bethune, Bowman, Dearness and Saunders, London.

THE SPIDERS OF THE ROCHPORT CAVE, MO.

BY CYRUS R. CROSBY, COLUMBIA, MO.

On December 30th, 1904, I examined for spiders a small cave on the north bank of the Missouri River, three miles below Rochport, Mo. This cave is occupied by a small stream, which enters it by an opening some distance from the river, and leaves it in a narrow gorge cut back in the bluffs.

At the mouth of the cave *Meta menardi*, Latr., was abundant in webs on the rocks, and one empty egg-sac was found, accompanied by a number of young, which an adult female seemed to be guarding.

On the piles of bat excrement were numerous pocket-like webs of *Teginaria brevis*, Em. When disturbed they sought shelter under the stones at the edge of which the webs were placed. Several females and two males were taken. On some driftwood brought in by the stream two specimens of *Erigone (Tmeticus) tridenta*, Em., one male and one female, were taken.

November, 1905.

About an eighth of a mile from the entrance is a branch which extends only a hundred feet or so from the main cave. In this chamber the air was more moist, and the walls were sweaty. Here specimens of *Troglohyphantes cavernicolus*, Keys, were found hanging in little sheet webs on the underside of projecting portions of the walls. With them were found several small, loose egg-sacs attached to the rock. The female of this species was described from Renold's Cave, Ky. (Keyserling, Spinn. Am., Therid., II, p. 123). The male is undescribed.

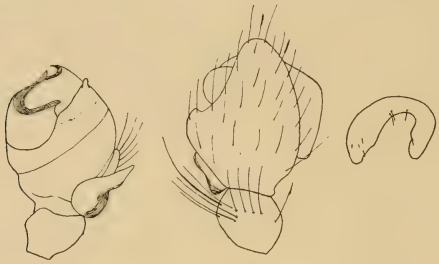


FIG. 20. FIG. 21. FIG. 22.

Troglohyphantes cavernicolus, Keys., male figures 20, 21 and 22. Length 1.82 mm.

Legs.	I.	II.	III.	IV.
Tar.	.65	.6	.48	.6
Met.	.99	.86	.74	.95
Tib.	1.04	.91	.74	1.04
Pat.	.26	.26	.22	.22
Fem.	1.08	1.04	.86	1.12

Cephalothorax broadly ovate, head rather high, gradually declined behind, rounded in the eye region and on the sides in front. Clypeus about twice as wide as the ocular area plane, and slightly projecting. Cephalothorax nearly bare, back of the eyes five more or less distinct radiating rows of hairs directed forward. Eye region and clypeus clothed with abundant short stiff black hairs. Eyes very small and colourless. Posterior eyes in a very slightly procurved line (when seen from in front strongly procurved), equidistant and nearly equal in size; anterior eyes

in a recurved line, the median smaller than the lateral, and separated by less than one-half the distance to the lateral. Cheliceræ long, slender, and divaricate at the tip, light brownish yellow, clothed on the sides and in front with short black hairs, longer towards the tip ; inner margin with a few long black setæ ; upper margin of the furrow armed with three long teeth. Sternum smooth, nearly white; sparsely clothed with short stiff black hairs. Labium and endites light brown, the latter white at tip. Abdomen nearly white, with a slight tinge of gray, very sparsely clothed with stiff black hairs. Legs light orange yellow ; femora of first and second legs armed with one spine each, the others unarmed, each patella with one long spine at tip, first and second tibiæ with two dorsal and two lateral spines, third with two dorsal spines, and fourth with one. Femur of palpus cylindrical, patella short, and bearing a long spine, tibia armed with long setæ, arranged more or less in transverse rows ; tarsus with a distinct emargination on the middle of the outer edge, accessory branch of the tarsus slightly enlarged towards base, bent to form a horseshoe, with the outer arm the shorter, armed near the middle with three small setæ and near the base with four minute hairs. On the inner side of the bulb there arise two strongly chitinized projections, the dorsal one serving as a support to the slender, moderately long style, with which it is connected by a hyaline membrane. Just outside of the base of the style there is a short black process slightly bent at the tip, usually hidden by the other parts. The lower surface of the bulb terminates in a blunt, weakly chitinized tooth. (Fig. 20).

On the caudal surface of the anterior coxæ there is a series of oblique striæ which closely resemble the corrugations on the sides of the cheliceræ in *Linyphia*, and which have been considered by Cambridge as stridulating organs. In this species the sides of the cheliceræ are smooth.

Explanation of Figures.

Fig. 20, *Troglohyphantes cavernicolus*, Keys. Male palpus from below.

Fig. 21, *Troglohyphantes cavernicolus*, Keys. Male palpus from above.

Fig. 22, *Troglohyphantes cavernico'us*, Keys. Male palpus accessory branch of tarsus.

NEW BEES OF THE GENERA OSMIA AND ANDRENA.

BY T. D. A. COCKERELL, BOULDER, COLO.

The bees now described not only appear to differ from any previously published; but they have been kindly examined by Messrs. Viereck and Titus, and found to differ from all of the numerous species which they have named in manuscript, and will shortly publish.

Osmia Davidsoniella, n. sp.

♂.—Length slightly over 8 mm., steel blue, the colour not especially bright, with dull white pubescence, which is long and erect on head and thorax; vertex and mesothorax closely and strongly punctured. Head larger, with the vertex broad; mandibles and antennæ black; flagellum slender, but not moniliform; mandibles strongly bidentate, the inner tooth broadly obliquely truncate; anterior edge of clypeus normal; tegulæ shining black; wings rather dusky, upper half of marginal cell strongly smoky, nervures black; legs black, hair on inner side of tarsi pale ferruginous; abdomen shining, with distinct but well-separated punctures; hind edge of sixth dorsal segment turned outwards, with a broad, very shallow emargination; seventh segment ending in two short spines, the interval between them being nearly twice the length of either.

Hab.—Los Angeles, California *(Davidson)*. A discussion of the relationship of this and the following species will be given by Mr. Titus in his revision of *Osmia*.

Osmia Titusi, n. sp.

♀.—Length about 8 mm, dark olive green, bluer on the abdomen, yellower on the face, the clypeus with about the anterior half black, and the part just above the black crimson. Legs dark chestnut red. Pubescence dull white, the ventral scopa white, but in the type specimen full of orange pollen. Head and thorax extremely densely punctured, abdomen with close minute punctures. Head broad; flagellum chestnut red beneath; mandibles dark reddish towards ends, bidentate, both teeth long and sharp; anterior margin of clypeus normal; tegulæ shining bright rufo-fulvous; wings slightly dusky, nervures piceous; hind spurs bright ferruginous; hind tibiæ stout, basal joint of their tarsi broad; abdomen subglobose. The marginal cell is comparatively short, and broadly rounded at end; in *O. Davidsoniella* it is much longer, and bluntly pointed.

Hab.—Los Angeles, California *(Davidson)*. Named after Mr. E. S. G. Titus, our best authority on the American species of *Osmia*.

November, 1905.

Andrena Milwaukeensis berberidis, n. subsp.

♀.—Smaller; hairs of metathorax all black; light hair on first two abdominal segments less conspicuous; hair of thorax above darker and redder; facial foveæ much narrower; hardly one third of the breadth from eye to middle line (in *Milwaukeensis* about half the breadth; clypeus more shining and closely punctured, without a median ridge).

Hab.—Boulder, Colorado, flying near *Berberis repens*, March 30, 1905 *(W. P. Cockerell)*. Also collected at Boulder by Mr. G. Weston. Mr. Viereck is disposed to regard this as a distinct species.

Andrena griseonigra, n. sp.

♂.—Length about 10 mm.; black, the head and thorax with abundant very long hair, black except on the dorsum of thorax, where it is dull white; cheeks not toothed; facial quadrangle very much broader than long; antennæ black, third joint conspicuously longer than fourth; flagellum stout; clypeus shining strongly and very closely punctured, without an impunctate line or ridge; process of labrum broad, faintly depressed in the middle, but not notched; mesothorax dull; area of metathorax coarsely but irregularly ridged, not bounded by a rim; tegulæ black; nervures and stigma piceous; legs with black hair, more or less pallid on outer side of tibiæ and hind tarsi; abdomen shining, with minute shallow punctures and black hair, that at apex becoming gray.

Hab.—Los Angeles, Calif. *(Davidson)*. Very close to *A. nigrihirta* (Ashm.), but larger, with dark spurs, dark stigma, etc.

Andrena perimelas, n. sp.

♀.—Length 16½ mm.; black, robust, with black pubescence, except that on thorax above, and a little on the vertex, which is a rather bright ochreous; wings strongly fuliginous, stigma and nervures ferruginous, the latter partly fuscous; process of labrum broadly rounded; clypeus very densely punctured, with an incomplete median smooth line; area of metathorax large, triangular, with a dull, minutely granular surface; abdomen distinctly but minutely punctured.

Hab.—Los Angeles, Calif. *(Davidson)*. This is a large, brightly-coloured offshoot from the northern series of *A. pluvialis* and its allies.

The abdomen is rougher, more hairy and duller than that of *A. pluvialis*. The form of the process of labrum at once separates it from *A. anograe*.

The two following species are entirely black, with black pubescence; they have the colour of *A. Porterae*, but are larger and stouter, and have not the strongly produced clypeus of that insect. They are considerably larger than *A. nigerrima*, Casad.

Andrena pertristis, n. sp.

♀.—Length about 15 mm.; black, with black pubescence, that on sides of metathorax slightly brownish; wings deep fuliginous; clypeus ordinary in form, strongly and very densely punctured all over, except a shining median line; malar space practically obsolete; process of labrum narrowly truncate, with sloping sides; thorax above dull, with a dense velvety pubescence; enclosure of metathorax a nearly equilateral triangle, the sides of which are gently concave, the lateral ones bounded by an incised line, the surface of the area marked by an irregular rather coarse wrinkling, not forming distinct plicæ, and not confined to the basal portion; abdomen closely and very minutely punctured.

Hab.—Los Angeles, Calif. *(Davidson)*.

Andrena subtristis, n. sp.

♀.—Length about 13 mm.; black, with black pubescence. Differs from *A. pertristis* by its smaller size; wings only slightly dusky; third submarginal cell much shorter; the densely punctured clypeus without a smooth line; last joint of flagellum reddish beneath; process of labrum with its apex thickened and having a slight pit; area of metathorax shorter (the angles of the triangle extremely acute), and rather more coarsely sculptured.

Hab.—Los Angeles, Calif., two *(Davidson)*. Others are in the collection of the American Entomological Society. Long ago named as new in MS. by Mr. Davis, of Cambridge, but the name he used is not available.

Erratum.—Page 362, line 5 from top, for *Cinophanus* read *Cirrophanus*

THE INFLUENCE OF THE APIDÆ UPON THE GEOGRAPHICAL DISTRIBUTION OF CERTAIN FLORAL TYPES.

BY J. ARTHUR HARRIS, ST. LOUIS, MO.

(Continued from page 357.)

In the three types to be considered in this place, then, the conspicuous portion of the perianth is almost always campanulate or more generally widely patent and sometimes reflexed. The anthers are regularly elongate in form, linear or subulate, and basifixed on filaments of greater or lesser length. The pistil is usually simple, with filiform style and punctiform stigma, but to this there are rare exceptions. The Dilleniaceous type is distinguished by its numerous, generally free, stamens with long or short filaments, and sometimes several pistils free almost to the base. In the Solanum-Cassia type the stamens are few, generally five or ten, and the pistil is one, with filiform style and simple punctiform stigma. The Melastomataceous type is distinguished from the Solanum-Cassia type by the elongate filaments.

In the systematic groups to which these forms have been assigned by taxonomists, they are for the most part aberrant, having, for instance, a patent perianth, while the type of the family may be campanulate or tubular, and elongate, basifixed anthers, while the type form in the family may be a short, versatile anther. This deviation from the type of the group to which they systematically belong renders their structural peculiarities more conspicuous, and leads us to seek for an explanation of their form in some special internal or external factor.

The explanation of floral peculiarities is usually sought in the method of their pollination, since it has been very generally assumed that flowers are adaptations. The floral ecology of the forms under consideration is by no means thoroughly known, but data are sufficient to be highly suggestive.

Concerning the Dilleniaceous type, the smallest of the three, no general statement can be made. Some of the forms seem to be ornithophilous, some may be anemophilous, and still others appear to be adapted to bees.

There can be little doubt that the Solanum-Cassia type represents an adaptation to the larger pollen-collecting bees. The class is practically coextensive with Delpino's Borago type, but includes also zygomorphic forms, which he treats elsewhere. *Solanum* and *Cassia* have been conclusively shown to be dependent for pollination upon the larger Apidæ, as

Bombus, *Xylocopa*, *Ceratina*, *Euglossa*, *Centris*, and other genera. These collect only pollen, since nectar is wanting. Of forms other than *Solanum* and *Cassia* we know little. One species of *Dichorisandra* examined in the living condition seems to show no secretion of free nectar. Several members of the family are known to be adapted to pollen-collecting Apidæ, and it is probable that the apically dehiscent forms are too. Analogy leads us to the same conclusion for *Monochoria* of the Pontederiaceæ, and for representatives of the Liliaceæ, Amaryllidaceæ, Pittosphoraceæ, Tremandraceæ, Ochnaceæ, Dipterocarpaceæ, Myrsinaceæ, Loganiaceæ and Rubiaceæ, while for *Ouratea* of the Ochnaceæ, *Begonia* of the Begoniaceæ and *Exacum* of the Gentianaceæ we have observations which indicate the validity of such an assumption. In this place space cannot be devoted to the structural and ecological comparisons which evidence strongly in favor of regarding all these forms as adapted to pollination by the larger pollen-collecting bees.

Our direct knowledge of the ecology of members of the Melastomataceous type is not extensive, and some of the more detailed studies have been made on forms which are anomalous rather than typical. It may be stated with much confidence, however, that the type is primarily as truly adapted to the larger Apidæ as is the Solanum-Cassia type.

We may now turn our attention to the only phase of the problem to be especially considered here.

It is evident that if certain plants are closely dependent upon special groups of insects for their pollination they will be limited in their geographical range by the distribution of these insects. This is exactly the condition which we seem to have in the present case. As has just been suggested, these forms are apparently adapted to pollination by the Apidæ, and the Apidæ are represented in the faunas of the several main divisions of the earth's surface in very different numbers, and this seems to determine the proportionate representation of these apically dehiscent types. Our knowledge of the Apidæ and their geographical distribution is still very incomplete, but such data as we have indicate that the bees occur in much greater abundance in tropical and extra-tropical South America, the Indian and the Australian regions than in many other portions of the globe. Because of the incompleteness of our data concerning the insects, the geographical distribution of the plants will be taken up first.

The impression of the greater abundance of these apically dehiscent forms in certain of the major divisions of the earth's surface seemed to be established by a consideration of the distribution of the forms themselves. Thus, of the monocotyledonous genera of the Solanum-Cassia type, 11 of the 19 were found to be endemic in South America, while another has 8 of its 10 species there. Of the Dicotyledons, 11 of the 40 genera are endemic in South America, and 7 others occur there, in five of the cases represented by the most of their species. Thus 57.8 per cent. of the monocotyledonous genera are endemic in South America, and 63.1 per cent. occur there, while of the dicotyledonous genera 27.5 per cent. are endemic and 45 per cent. occur there. Altogether 30 of the 59 genera, or 50.5 per cent., occur in South America. This type is also strongly represented in the Indian and Australian region, while elsewhere it occurs but sparingly.

The Dilleniaceous type shows a very similar distribution, but is found most abundantly in the Indian instead of the tropical American region. The Melastomataceous type is almost exclusively South American and Indian.

These facts certainly seem to indicate the greater abundance of these floral forms in the South American, Indian and Australian regions. It early became evident, however, that the problem of the geographical distribution of these forms is one very difficult of approach. The apically dehiscent types clearly showed a more or less localized distribution, but it was also seen that in the region where the apically dehiscent genera are most abundant the flora as a whole also appears richer, and it became clear that any valid conclusions concerning distribution must be based on statistical comparisons, not merely of the apically dehiscent forms, but of all genera as well. It seemed most advisable to make the comparison by genera, and to take the data for the purpose from Engler and Prantl's Die Natürlichen Pflanzenfamilien.

The earth was divided into fourteen floristic regions patterned after those of Drude, but of necessity limited more arbitrarily, as follows:

I. Tropical Regions.

1. Tropical African Region.
2. East African Island Region.
3. Indian Region.
4. Tropical American Region.

II. Austral Regions.
5. South African Region.
6. Australian Region.
7. Austral American Region.
8. New Zealand Region.
9. Antarctic Region.

III. Boreal Regions.
10. Mediterranean-Oriental Region.
11 Central Asian Region.
12. East Asian Region.
13. Central North American Region.
14. Northern Region.

The distribution of the 8,541 genera of flowering plants, both in actual numbers and in per cents. of the total number of plants, is represented in Table A.

TABLE A.

All Genera of Flowering Plants.

Region.	Endemic.	Others.	Total.
1	542 = 6.34%	1116	1658 = 19.41%
2	259 = 3.03%	579	838 = 9.81%
3	1126 = 13.18%	1344	2470 = 28.91%
4	1968 = 23.04%	1160	3128 = 36.62%
5	394 = 4.61%	468	862 = 10.09%
6	444 = 5.19%	712	1156 = 13.53%
7	175 = 2.04%	506	681 = 7.97%
8	23 = .27%	187	210 = 2.45%
9	4 = .04%	21	25 = .29%
10	455 = 5.32%	819	1274 = 14.91%
11	68 = .79%	549	617 = 7.22%
12	171 = 2.00%	846	1017 = 11.90%
13	335 = 3.92%	871	1206 = 14.12%
14	73 = .85%	654	727 = 8.51%

An examination of the figures presented in this table reveals the fact that 6,037 occur in only a single one of the fourteen regions, while the other 2,504 are of more general distribution. Of the 6,037 endemic genera 3,713, or 61.4 per cent. of the endemic forms are found only in the Tropical American, Indian, Australian or extra-tropical South American regions. Expressing the relationship somewhat differently, we find that the 3,713 found exclusively in regions 3, 4, 6 or 7 are 43.4 per cent. of the total 8,541 genera of flowering plants. In the Indian region occur exclusively 13.1 per cent. of all genera of flowering plants, in the tropical American region 23 per cent., in the Australian region 5.1 per cent., and in the extra-tropical South American region 2 per cent. Altogether about 70 per cent. of all genera of flowering plants occur exclusively in one or the other of the fourteen regions recognized—an average of 5 per cent. per region. The average for the four regions, 3, 4, 6 and 7, which particularly interest us in the present problem, is 10.8, while for the other ten regions it is 2.6 per cent. Turning now to the total number of genera of plants occurring in these several regions, we find that in the Indian region occur 28.9 per cent. of all genera, in the Tropical American region 36.6 per cent., in the Australian region 13.5 per cent., and in the extra-tropical South American region 7.9 per cent. The average for these four regions is 21.7 per cent., while for the other ten regions it is 9.8 per cent.

It is clear that in the regions which have been indicated as those in which apically dehiscent genera are most abundant, the whole flora is also much richer, both as a whole and in endemic forms. This renders necessary the greatest care in comparison.

The Solanum-Cassia type seems to be the one best adapted for a first examination of the hypothesis of specialized distribution; in numbers it is next to the largest type, it is the one of the widest geographical range, and it is made up of representatives from several widely-separated families, so that its uniformity of structure and localized distribution cannot so readily be accounted for on the supposition of community of descent. The distribution of the genera is shown in table B.

TABLE B.

Genera of the Solanum-Cassia Type. Distribution.

Region.	Endemic.	Others.	Total.
1	2 = 3.38%	8	10 = 16.94%
2	1 = 1.69%	7	8 = 13.55%
3	7 = 11.86%	9	16 = 27.11%
4	17 = 28.81%	9	26 = 44.06%
5	2 = 3.38%	3	5 = 8.47%
6	12 = 20.33%	6	18 = 30.50%
7	4 = 6.77%	4	8 = 13.55%
8		2	2 = 3.38%
9		..	
10		2	2 = 3.38%
11		2	2 = 3.38%
12	1 = 1.69%	4	5 = 8.47%
13		4	4 = 6.77%
14		1	1 = 1.69%

We find that the Indian region has 11.8 per cent., the South American 28.8 per cent., the Australian region 20 3 per cent., and the extra-tropical South American region 6.7 per cent. of the members of this type confined exclusively to their limits. The average for these four regions is 16.9 per cent., while the average for the other ten regions is .9 per cent., six of the regions having no endemic representatives of this type at all. Considering all representatives of the Solanum-Cassia type occurring in the several regions, whether endemic there or not, we find that the Indian region contains representatives of 27.1 per cent. of the 59 genera, the tropical South American region 44 per cent., the Australian region 30.5 per cent., and the extra-tropical South American 13.5 per cent. The average for

the four regions is 28.8 per cent., while for the other ten regions, all but one of which contain at least one genus of this class, average 6.5 per cent. These numbers are easily compared with those for all plants. It will be observed that while the average per cent. of endemic apically dehiscent genera is 16.9 for the four regions, and .9 for the ten others, for all endemic genera the average is 10.8 and 2.6 per cent. respectively. Thus, in regions 3, 4, 6 and 7 the relative abundance of the Solanum-Cassia type may be expressed as +5.6 and for the other ten as —1.7. Comparing the relative abundance of all genera occurring, we find that for the four regions it may be represented by +4.5, while for the other ten regions it is —3.3. While the Solanum-Cassia type is abundantly represented in the Indian region, the per cent. of endemic forms and all forms of this type occurring there is something more than one less than the per cents of all the genera of flowering plants which are found in the flora. Next to the tropical American region the flora of the Indian region is the richest of the fourteen regions recognized, and the abundance of the Solanum-Cassia type there seems to be due rather to the richness of the whole flora than to any special conditions favouring its development. Considering only the three regions, 4, 6 and 7, we find that the average per cent. of genera of the Solanum-Cassia type endemic is 18.6, while for the other eleven regions it is 1.9. For all genera of the Solanum-Cassia type occurring, the three regions average 29.3 per cent.. while the other eleven regions average 8.4 per cent. Comparing these figures with those obtained for all genera of plants, we find that in the tropical American, Australian and extra-tropical South-American regions the per cent. of apically dehiscent genera endemic in the several regions is 8.3 more than that for all genera, while in the other eleven regions it is 1.7 less, and for all apically dehiscent genera of the Solanum-Cassia type occurring the per cent. for the three regions averages 10 more than that of all forms, while for the other regions it averages 3.1 less.

The present work is essentially a comparison of the distribution of floral structures, but these floral structures are thought to be adaptations to a factor in the environment, which so differs in potency in the several regions under consideration as to bring about a difference in the frequency of occurrence of these floral types.

In a problem of biogeography which involves taxonomic, morphological and ecological considerations,it is difficult to decide just what shall be the basis for comparison. The characteristics of genera probably furnish most satisfactorily the morphological units which we seek, but ecologically the importance of the genus in the flora may be vastly increased by specific differentiation.

Without attempting any comparison with the number of species of the whole flora, we may examine the distribution of the species of the Solanum-Cassia type. The differentiation of Solanum and Cassia in tropical South America first called attention to the distributional phase of

the problem in hand, and since the species of these genera are so numerous as to obscure any contradictory evidence afforded by other genera, the distribution by percents of the 970 species of *Solanum*, the 412 of *Cassia* and the 445 of all other genera may be indicated separately as in the accompanying table C.

TABLE C.

Species of Solanum and Cassia compared with others of same type.

Region.	Solanum.	Cassia.	Others.
1	5.98%	6.55%	22 = 4.94%
2	1.34%	2.43%	19 = 4.26%
3	7.22%	8.49%	59 = 13.25%
4	64.85%	70.39%	223 = 50.11%
5	2.68%	.73%	8 = 1.79%
6	5.36%	8.01%	101 = 22.69%
7	7.53%	4.13%	12 = 2.69%
8	.10%		1 = .22%
9			
10	2.66%	3.39%	
11		.31%	1 = .22%
12	.82%	.49%	3 = .67%
13	1.44%	2.67%	4 = .89%
14	.52%		

It is evident from these figures that *Solanum* and *Cassia* have a very similar distribution, with which the species of the 47 other genera of this type are also in close agreement.

Summarizing the data presented in this table, it is found that tropical America has 62.5 per cent. of all the 1,827 species of the Solanum-Cassia type, the Indian region 8.9 per cent, the Australian region 10.1 per cent., and the extra-tropical South American region 5.4 per cent. The average for the remaining ten regions is 1.5 per cent.

(To be continued.)

A SKELETON OF A NEW ARRANGEMENT OF THE FAMILIES, SUBFAMILIES, TRIBES AND GENERA OF THE ANTS, OR THE SUPERFAMILY FORMICOIDEA.

BY WILLIAM H. ASHMEAD, M. A., D. SC.

Of the *ten* superfamilies recognized in my classification of the Hymenoptera, all have been classified down to genera except the Ants, or superfamily IV, Formicoidea, a very large and most difficult complex, and rendered even more difficult by the extraordinary number and diversity of the sexes, there being sometimes several different forms to a single species.

It has now been several years since I began working on this great complex to bring it in harmony with the other superfamilies classified, and my labours are nearly completed, as I only await the arrival of certain exotic genera to perfect some of the generic tables. The work fills several hundred pages of manuscript, and will make a large volume in itself, too large to be published in any entomological journal or magazine, and as the completed work cannot be published before next year, I desire to put on record a skeletonized epitome of the arrangement, selecting for that purpose the CANADIAN ENTOMOLOGIST, in which the classification of other of the superfamilies were published.

It will be noticed that I recognize as valid genera nearly all of the subgenera of Mayr, Forel and Emery, and that I restore the genera *Monacis*, Roger, and *Hypoclinea*, Mayr, suppressed by Emery and Forel as synonyms of *Dolichoderus*, Lund. All three are good genera. *Dolichoderus*, Lund, is not found in the United States, and our species so-called belong to *Hypoclinea*, Mayr. *Monacis*, Roger, I know only from Mexico.

Superfamily IV.—FORMICOIDEA.

Family XLIII.—*Dorylidæ*.

Subfamily I.—Ecitoninæ.

Tribe I.—Ecitonini. Genera: Eciton, Latr.; Acamatus, Emery; and Mayromyrmex, Ashm., n. g. (Type *Labidus Fargeaui*, Shuck., So. Am.); also *L. morosus*, Smith, Mex.

Tribe II.—Ænictini. Genera: Ænictus, Shuck., and Ooceraea, Roger.

Subfamily II.—Dorylinæ.

Tribe I.—Ænictogitonini. Genus Ænictogiton, Emery.

Tribe II.—Dorylini. Genera: Alaopone, Emery; Rhogmus, Shuck.; Dichthadia, Gerst.; Typhlapone, Westw.; Dorylus, Fabr.; ?Sphinctomyrmex, Mayr; Shuckardia, Emery; Probolomyrmex, Mayr; Cheliomyrmex, Mayr.

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Subfamily III.—Acanthostichinæ.

Genera: Acanthostichus, Mayr, and Ctenopyga, Ashm., new genus; type C. Townsendi, Ashm., from Mexico.

Family XLIV.—*Poneridæ.*

Subfamily I.—Ponerinæ.

Tribe I.—Onychomyrmicini. Genus Onychomyrmex, Emery.

Tribe II.—Ceropachyini. Genera: Phyracaces, Emery; Cerapachys, Smith; Parasycia, Emery; Sycia, Roger; Cystias, Emery.

Tribe III.—Proceratiini. Genera: Discothyrea, Roger; Sysphincta, Roger; Proceratium, Roger; Prionopelta, Mayr.

Tribe IV.—Ponerini. Genera: Centromyrmex, Mayr; Trapeziopelta, Mayr; Myopias, Mayr; Cryptopone, Emery; Rhopalopone, Emery; and Ponera, Latr.

Tribe V.—Leptogenyini. Genera: Prionogenys, Emery; Leptogenys, Roger; Lobopelta, Mayr; and Simopone, Forel.

Subfamily II.—Pachycondylinæ.

Tribe I.—Lioponerini. Genus Lioponera, Mayr.

Tribe II.—Amblyoponini. Genera: Myopopone, Roger; Mystrium, Roger; Emeryella, Forel; Stigmatomma, Roger; Amblyopone, Erichson.

Tribe III.—Cylindromyrmicini. Genera: Cylindromyrmex, Mayr, and Thaumatomyrmex, Mayr.

Tribe IV—Pachycondylini. Genera: Psalidomyrmex, André; Plectroctena, Smith; Odontoponera, Mayr; Diacamma, Mayr; Bothroponera, Mayr; Ectomomyrmex, Mayr; ? Heteroponera, Mayr; Belonopelta, Mayr; Pseudoponera, Emery; Pergandea, Ashm., n. g. (So. Am.); Brachyponera, Emery; Mesoponera, Emery; Pachycondyla, Smith; Neoponera, Emery; Ophthalmoponera, Mayr; and Titusia, Ashm., n. g. (So. Am.).

Tribe V.—Ectatommini. Genera: Platythyrea, Mayr; Alfaria, Emery; (? = Mictoponera, Forel); Stictoponera, Mayr; Ectatomma, Smith; Gnamptogenys, Roger; Acanthoponera, Mayr; Paraponera, Smith; Holcoponera, Mayr; Rhytidoponera, Mayr; Chalcoponera, Emery; Streblognathus, Mayr; Dinoponera, Roger; Paltothyreus, Mayr; and Megaponera, Mayr.

Tribe VI.—Drepanognathini. Genus Drepanognathus, Smith.

Subfamily III.—Myrmeciinæ.

Genus Myrmecia Fabricius.

Family XLV.—*Odontomachidæ.*

Genera: Odontomachus, Latr.; Champomyrmex, Emery; Anochetus, Mayr; and Stenomyrmex, Mayr.

Family XLVI.—*Myrmicidæ.*

Subfamily I.—Pseudomyrminæ.

Genera: Sima, Roger, and Pseudomyrma, Lund.

Subfamily II.—Myrmicinæ.

Tribe I.—Myrmicini. Genera: Acanthonyrmex, Emery; Pogonomyrmex, Mayr; Cratomyrmex, Emery; Janetia, Forel; Ephebomyrmex, Wheeler; Myrmica, Latreille; Megalomyrmex, Forel; Holcomyrmex, Mayr; Ischnomyrmex, Mayr; Xiphomyrmex, Mayr; Messor, Forel; Goniomyrmex, Emery; Pheidole, Westw.; Dichothorax, Emery; Hypopheidole, Ashm., n. g.; Trigonogaster, Forel; Oxyopomyrmex, André; Lophomyrmex, Emery; and Pristomyrmex, Mayr.

Tribe II.—Tetramoriini. Genera: Triglyphothrix, Forel; Rogeria, Emery; Eutetramorium, Emery; Tetramorium, Mayr; Strongylognathus, Mayr; Dacryon, Forel; Monomorium, Mayr; and Ochetomyrmex, Mayr.

Tribe III.—Cremastogasterini. Genera: Cremastogaster, Lund, and Oxygyne, Forel.

Tribe IV.—Solenopsidini. Genera: Pheidologeton, Smith; Solenopsis, Westwood; and Æromyrmex, Forel.

Tribe V.—Myrmecariini. Genera: Carebara, Westwood, and Myrmecaria, Saunders.

Tribe VI.—Melissotarsini. Genus Melissotarsus, Emery.

Tribe VII.—Myrmecinini. Genera: Myrmecina, Curtis, and Podomyrma, Smith.

Tribe VIII.—Stenammini. Genera: Atoponyrmex, André; Cardiocondyla, Emery; Epœcus, Emery; Adelomyrmex, Emery; Phacota, Roger; Erebomyrmex, Wheeler; Diplomorium, Mayr; Allomerus, Mayr; Oligomyrmex, Mayr; Macromischa, Roger; Rhoptromyrmex, Mayr; Tranopelta, Mayr; Vollenchovia, Mayr; Xenomyrmex, Mayr; Harpagoxenus, Forel (= Tomognathus, Mayr); Symmyrmica, Wheeler; Formicoxenus, Mayr; Stereomyrmex, Mayr; Stenamma, Westw.; Leptothorax, Mayr; Wasmannia, Forel; ? Liomyrmex, Mayr; Leptanilla, Emery; Epipheidole, Wheeler; Sympheidole, Wheeler; and Huberia, Forel.

Family XLVII.—*Cryptoceridæ.*

Subfamily I.—Attinæ.

Genera: Atta, Fabr.; Acromyrmex, Mayr; Trachymyrmex, Mayr; Sericomyrmex, Mayr; Myrmicocryptus, Smith (= Glyptemyrmex, Forel); and Apterostigma, Mayr.

Subfamily II.—Dacetonini.

Genera: Daceton, Perty; Acanthognathus, Mayr; Mycocepurus, Forel; Orectognathus, Smith; Epitritus, Emery; Strumigenys, Smith; Epopostrum, Forel; Rhopalothrix, Mayr; Cyphomyrmex, Mayr; and Ceratobasis, Smith.

Subfamily III.—Cryptocerinæ.

Genera: Procryptocerus, Emery; Cryptocerus, Latr.; and Zacryptocerus, Ashm., n. g. (type Cryptocerus multistrigus, Sm.)

Subfamily IV.—Cataulacinæ.

Genera: Otomyrmex, Forel; Cataulacus, Smith; Calyptomyrmex, Emery; and Meranoplus, Smith.

Family XLVIII.—*Dolichoderidæ.*

Genera: Monacis, Roger; Hypoclinea, Roger; Aneuretus, Emery; Dolichoderus, Lund; Leptomyrmex, Mayr; Turneria, Forel; Bothriomyrmex, Mayr; Forelius, Emery; Tapinomma, Forster; Dorymyrmex, Mayr; Iridomyrmex, Mayr; Liometopum, Mayr; Linepithema, Mayr; and Azteca, Forel.

Family XLIX.—*Formicidæ.*

Subfamily I.—Gesomyrmicinæ.

Tribe I.—Myrmoteratini. Genus Myrmoteras, Forel.

Tribe II.—Gigantiopini. Genus Gigantiops, Roger.

Tribe III.—Gesomyrmicini. Genera: Gesomyrmex, Mayr, and Dimorphomyrmex, André.

Subfamily II.—Camponotinæ.

Tribe I.—Œcophyllini. Genus Œcophylla, Smith.

Tribe II.—Polyrhachidini. Genera: Echinopla, Smith; Hemioptica, Roger; and Polyrhachis, Smith.

Tribe III.—Camponotini. Genera: Opisthopsis, Emery; Tanæmyrmex, Ashm., n. g. (type Formica longipes, Gerst.); Mayria, Forel; Calobopsis, Mayr; Camponotus, Mayr; Dinomyrmex, Ashm., n. g. (type Formica gigas, Latr.); Rhinomyrmex, Forel; Orthonotus, Ashm., n. g. (type Formica sericea, Fabr.); Calomyrmex, Emery; and Dendromyrmex, Emery.

Subfamily III.—Formicinæ.

Tribe I.—Plagiolepidini. Genera: Notoncus, Emery; Prenolepis, Mayr; ? Mesoxena, Smith; Acantholepis, Mayr; Acropyga, Roger; Plagrolepis, Mayr; Myrmelachista, Roger; Brachymyrmex, Mayr; Aphomyrmex, Emery.

Tribe II.—Lasiini. Genera: Proformica, Ruszky; Melophorus, Lubbock; Lasius, Fabricius; and Acanthomyrmex, Mayr.

Tribe III.—Formicini. Genera: Myrmecocystus, Wesmael; Formica, Linné; and Polyergus, Latreille.

MOSQUITO NOTES.—No. 4.

BY C. S. LUDLOW, M. SC.,
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Among the mosquitoes lately sent from the various Army Stations are the following, of interest mostly because of their apparent close relation to already known forms :

Uranotænia cæruleocephala, Theob., var. *lateralis*, n. var.— ♀. Head covered with flat blue scales, becoming white around the eyes, a couple of brown bristles between, and a few around, the eyes, no fork scales; the scales on the occiput change from a dark indigo or violet to a light blue, according to the direction of the light, and when viewed from the side may even seem brown with a wide white border around the eyes, but in other positions are some shade of blue ; antennæ brown, verticels and pubescence brown, basal joint light testaceous, with a few thin flat scales; palpi also light brown, very short, hardly longer than the depth of the clypeus, the last joint reduced to a knob ; proboscis dark brown, swollen at the tip ; clypeus testaceous ; eyes brown and silver.

Thorax brown, prothoracic lobes covered with flat scales, which change from white to bright blue ; mesothorax covered with long slender brown scales, slightly if at all curved, suggesting lateral wing scales in their general appearance, a median row of long brown bristles, and clusters of them near the wing joint and scutellum, a small bunch of flat changeable (bright blue to white) scales just cephalad of the wing joint; scutellum brown, covered with brown flat scales, with green iridescence, and a few border bristles ; pleura brown, with one large bunch of flat changeable (bright blue to white) scales on the mesopleura ; metanotum brown.

Abdomen brown, heavily covered with brown flat scales, with green iridescence, unbanded, but with well marked lateral, apical white spots on each segment ; venter almost entirely light scaled.

Legs : coxæ and trochanters light, and white scaled, femora all light ventrally, but brown dorsally, the tibiæ much darker, and the remainder of the legs brown ; ungues very small, simple and equal.

Wings brown, covered with brown scales, the median broad, rather short, and often truncate, the lateral broadly lanceolate, and much longer than the median ; 1st submarginal cell much (¼) shorter and somewhat narrower than the 2nd posterior, the stem nearly three times as long as the cell, and a third longer than that of the 2nd posterior ; posterior cross-

vein is about the same length as the mid cross-vein, and distant about its own length ; halteres white, a few dark scales on the knob.

Length 2.5 mm. Taken June 25, 1905. Habitat, Cottabatto, Mindanao, P. I.

Described from four females sent by Lieut. E. B. Vedder, Asst. Surgeon, U. S. A. The distinctive variation lies in the well-marked lateral spots, and if it should happen that Theobald described from rubbed specimens, that variation may disappear.

Culex Portoricensis, n. sp.— ♀. Head dark, with a narrow median line of ochraceous curved scales, light forked scales upon the occiput, and reaching well up toward the vertex; the median curved scales followed by light flat scales and a narrow stripe of dark flat scales on the side ; antennæ dark brown, verticels and pubescence brown, basal joint brown, with a few flat lighter brown scales ; palpi dark brown, a few white scales at the tips ; proboscis very long, dark brown, with a minute white band, at times merely a trace, near the middle ; clypeus dark brown ; eyes brown and garnet.

Thorax dark brown ; prothoracic lobes with light spindle-shaped scales ; mesonotum sparsely covered with small, slender curved golden brown scales on the sides, the median portion partly denuded, but some dark brown spindle-shaped scales remaining ; scutellum dark, with light, slender curved scales ; pleura dark brown, with numerous small patches of flat, white scales ; metanotum dark brown.

Abdomen dark, covered with dark brown scales ; very narrow basal white bands, and small basal white lateral spots ; venter mostly white scaled.

Legs : coxæ and trochanters dark, with light scales ; femora dark brown dorsally, almost white ventrally, more markedly so on the hind legs ; tibiæ brown, as are all the remaining joints, but on the hind legs the metatarsi, the first, second, third and sometimes the fourth tarsal joints have minute basal white spots, not amounting to bands ; on the mid legs the spots appear on the metatarsi, first and second tarsal joints, and on the fore legs there are minute yellowish spots at the tips of the tibiæ, and base and apex of the metatarsi, the remaining joints being brown. Fore and mid ungues uniserrate.

Wings brown, with brown scales; cells rather short; the first submarginal a little longer and narrower than the 2nd posterior cell, the stem of each about two-thirds as long as the cells, the bases nearly in a line; the cross veins are all nearly the same length, mid and supernumerary meet, and the posterior cross-vein is distant about its own length from the mid; halteres have light stem and fuscous knob.

The male greatly resembles the female; the palpi are long, with golden brown plumes, and four narrow white bands; fore and mid ungues biserrate.

Length 3.5–4 mm. Taken Aug. 15, 1905. Habitat, San Juan, Porto Rico.

Described from several specimens sent by Dr. L. G. de Queveda, Cont. Surg. U. S. A., which were taken at the Quarantine Station, Yellow Fever Hospital and Quarters; it at first glance suggests *C. tæniorhynchus* minus the hind legs, and probably lies near that, but is evidently distinct.

Finlaya ? nigra, n. sp.—♀. Head black, densely covered with ochraceous, almost white, scales, broad spindle-shaped and forked scales on the occiput, extending up to the vertex, spindle-shaped scales around the eyes, flat scales on the sides, a few light bristles extending forward between the eyes, and dark ones around the eyes; antennæ very dark brown, almost black, apparently fourteen-jointed, verticels brown, pubescence white, a few scales on the first joint, basal joint testaceous, with fine light erect hairs, and a few small flat scales; proboscis very dark brown, with violaceous reflections; palpi very dark brown, not unusually heavily scaled, a few hairs at the tip; clypeus dark brown, eyes dark brown.

Thorax black; prothoracic lobes clothed with flat white scales; mesothorax with dark brown curved scales, except the sides and "shoulders," the former heavily covered with broad spindle-shaped white scales, the latter with white broad-ended flat scales, a line of broad curved white scales around the "bare space," some light bristles projecting forward at the nape, a short line of them near the "bare space," and a heavy bunch over the wing joint; scutellum partly denuded, but the basal row of scales is *curved*, the remainder flat. The scales on the mid lobe white, those on the lateral lobes a very dark brown, long light bristles, probably six, on the mid lobe; pleura very dark, with a few large patches of white flat scales; metanotum dark brown.

Abdomen dark, heavily scaled with dark brown flat scales (with violaceous reflections), and small white, basal, lateral spots, apical hairs

light ; venter mostly white-scaled, but dark apical bands on some of the distal segments. There is some suggestion of tufts on the ventral side, but not well marked, and may be due to the position in which the specimen dried.

Legs : coxæ and trochanters light and sparsely light scaled; ventrally the femora are all light scaled, and in the hind legs are dorsally light scaled about one-half (basal) their length, and are rather heavily bristled. The remainder of the legs is brown, with the exception of a rather brilliant knee spot on the hind legs, a smaller one on the mid legs, and in some lights a light line the length of the fore tibiæ on the caudal side ; ungues rather large and heavy, equal and uniserrate.

Wings clear, brown veined, rather heavily scaled with dark, broad, truncated brown scales, suggesting typical *Taeniorhynchus* scales, and having violaceous reflections. Fork cells very long; 1st submarginal about a fifth longer and somewhat narrower than the 2nd posterior cell, stem not half the length of the cell, and the same length as that of the 2nd posterior ; the supernumerary cross vein a little interior of the mid, and about the same length, the posterior nearly twice as long as the mid cross-vein, and more than double its own length interior ; halteres light. The third vein extension is more marked than often found, but not so decided as in *Desvoidea fusca*, Theob.

Length 5.5 mm. Taken Aug. 3, 1905. Habitat, Rock Island Arsenal, Ill.

Described from one specimen sent by Dr. G. G. Craig, Cont. Surg. U. S. A., in some very interesting collections from Rock Island Arsenal. While the characteristics do not agree fully with Theobald's definition of *Finlaya*, they correspond more closely to those of this than to those of any other existing genus, and I have therefore referred it, provisionally at least, to *Finlaya*. The species is extremely interesting, because it is, so far as I can ascertain, the first having this peculiar grouping of scales to be reported from the United States.

Another instance of small variation occurs in the *Culex confirmatus*, Arribalzaga, sent me by Lieut. R. Boyd Miller, Asst. Surg. U. S. A., from Fort Screven, Tybee Island, Ga., which agrees perfectly with the description given by Theobald (Monograph, Vol. II, pg. 42), except that the femora are white nearly to the apex *dorsally* as well as ventrally, and *all* the ungues are uniserrate ; the latter is, of course, the important variation.

(To be continued.)

THE HEMIPTERA HETEROPTERA IN "AMERICAN INSECTS."

BY J. R. DE LA TORRE BUENO, NEW YORK.

When I saw Professor Vernon L. Kellogg's new "American Insects" advertised, I determined to possess a copy, which I thought would very naturally give a little more space than "Comstock's Manual" to the Heteroptera, and, being a much more recent publication, would be free, with regard to the Waterbugs, from the misstatements and errors of fact of its predecessors and therefore serviceable as a book of reference. Very fortunately (from my point of view), a friendly bookseller allowed me to examine the volume and in consequence I was able to spare myself a useless expense. To the Heteroptera, Professor Comstock devoted twenty-eight pages when he wrote in 1894; in spite of the great mass of publications since, Professor Kellogg devotes no more than twenty-three pages to the same families. The classification he employs is the same as in Comstock, although the far more scientific one of Schiödte was put forth in 1870 in English and has since been extensively adopted by Hemipterists of repute and by the authors of such general works as "The Cambridge Natural History, Insects" by Dr. Sharp, who is without doubt a competent entomologist. Moreover, in the Waterstriders, the obsolete and wrong Burmeisterian nomenclature is followed closely in the families and genera. We find there "*Family Hydrobatidæ*" instead of the correct "*Gerridæ*," and Genus "*Hygrotrechus*" in place of "*Gerris*." The familiar (and *wrong*) "*Limnobatidæ*" appears for "*Hydrometridæ*," and, of course, "*Limnobates*" for "*Hydrometra*." But I will say this: Professor Kellogg sins in good company in this respect. Of course, his arrangement of the families is frankly and avowedly conventional, and in the rather unsettled condition of the phylogenetic relations of the Heteroptera is less misleading than the average attempt to express them in a linear order.

Some few statements and figures call for correction. The entire name "*Limnobates lineata*" is obsolete since 1900, when it was definitely shown to be preoccupied specifically and wrong generically, in *The Entomologist* for that year. On page 198 of his book, Professor Kellogg states ". . . . this species is the only representative of the family found in this country." It might have been better to qualify this statement, since it is likely not only that some Mexican forms occur in the South-west, but also that new ones may be discovered on both our seaboards. I noted in

the CANADIAN ENTOMOLOGIST early this year the occurrence of Say's *Hydrometra australis* in Georgia and Florida. He also fails to mention its life-history, which was worked out by Martin in 1900 and confirmed by myself in 1904 (and again this year).

Referring to *Corixidæ* and *Notonectidæ*, he remarks on page 199: "The complete life-history of no member of either of these families is yet known, but it ought not to be a difficult matter for some patient observer to add this knowledge to entomological science. In this statement he echoes Dr. Howard in "The Insect Book." Nevertheless, Kirkcaldy, who is an expert entomologist, tried two years in succession to breed *Notonecta glauca*, and did not succeed; while I have had ova and two or three nymphal stages the last four summers, and have not been able to bring them beyond the second or third moult. What the condition is that stands in the way is as yet obscure. On the same page he states with reference to the *Naucoridæ*: "The life history of no member of this family is known." Had he consulted the Journal of the New York Entomological Society, Vol. XI., pp. 166 to 173, he would at once have eliminated this sentence. There is a fairly detailed life-history of *Pelocoris femorata* in those pages. His statement with regard to the *Belostomatidæ*, that "The two largest species of this family, both common in this country, are *Belostoma Americanum* and *Benacus griseus* . . . ," is misleading, for the reason that in Texas and Arizona, at least, *Amorgius* (*Belostoma*, Olim.) *annulipes* must occur and that in our South-eastern States we find *Amorgius Uhleri*, Montandon, which is very near in size and appearance to *A. Americanum*. The figure of "A Water Scorpion, *Ranatra fusca*" (fig. 275, p. 201), is, unfortunately, a nymph in the last instar and *not* an adult. *Ranatra* has never, to my knowledge, been found with aborted or rudimentary hemelytra in the adult. In addition, the anterior femora are too broad for *Ranatra fusca*, and the figure in all likelihood represents one of the undescribed Western forms in the U. S. National Museum collection.

"*Galgulus*" is employed on page 202, instead of the correct *Gelastocoris*, which was used by Champion in the Heteroptera part (Vol. II) of Biologia Centrali Americana, because it, unfortunately, has been preoccupied in *Aves* for 145 years. With regard to this family, Professor Kellogg says on this page, "A species of toad-bug, *Galgulus oculatus* (figs. 279 and 280), is common all over the country." His figures do not represent *oculatus*, which is very fairly delineated in its salient features by Professor Uhler in the "Standard Natural History." The

species figured in " American Insects " is too cleanly and clearly marked an insect, and is possibly *Gelastocoris variegatus* or one of the several undescribed Western and Southern forms I am acquainted with. These are the principal points worthy of comment in the section devoted to the Waterbugs, wherein my familiarity with the subject enables me to appreciate more keenly any slip.

The landbugs, with which my acquaintance is not very profound, are naturally much better treated, as those referred to are of economic importance and therefore much more studied. Here, however, I would call attention to a printer's error on page 214, where *Jalysus spinosus* is written "*Zalysus*" *spinosus*. The distinction between *Aradids* and the bedbug is thus brought out on page 208, " But all adult flatbugs have wings, while all the bedbugs are wingless." Unfortunately for the accuracy of this statement, *Aradus cinnamoneus*, which in colour and size very much resembles the uninvited midnight guest, is, at least in this vicinity, normally wingless in the adult.

It is to be regretted that a recent work in a field where great steps forward are being taken constantly, should have its generally high standard lowered by inaccuracies which might easily have been avoided. Why are not particular Orders or portions of Orders submitted to authorities in the groups of which they treat before the MS. goes to the printer? There is much room for disagreement in matters of opinion, but none in matters of proven fact. The book is typographically excellent, and the figures, at least in the Heteroptera, very finely drawn, engraved and printed. In this respect it is superior to its predecessors, and save for these corrections and notes, the text is very suitable for general students and very entertainingly written.

A GALL ON BEARBERRY (ARCTOSTAPHYLOS).

BY T. D. A. COCKERELL, BOULDER, COLO.

In the case of any circumpolar plant, it is of much interest to learn whether the insects and fungi attacking it are the same in Europe, Asia and America. The Bearberry (*Arctostaphylos uva-ursi*) is already known to have a coccid (*Targionia Dearnessi*, Ckll.) infesting it, which is only known to occur in America. This *T. Dearnessi*, however, is not confined to the *Arctostaphylos*, for Professor L. Bruner sent me specimens which he collected Oct. 24, 1900, at Weeping Water, Nebraska, on *Ceanothus Americanus*.

At Ward, Colorado, July 19, 1905, at an altitude of about 9,000 feet, I found the *Arctostaphylos uva-ursi* badly infested by an aphid which produced bright red galls about 10 mm. long and 4 broad upon

the leaves. These resulted from the folding over of the edge of the leaf, or sometimes both edges, forming a pocket in which were many aphides ; wingless forms, pupæ with wing-pads, and young. No such gall has ever been found in Europe or Asia, and it is highly probable that we have an endemic American form confined to the bearberry.

The wingless forms (♀) are broad pyriform, subtruncate behind, about 1,350 μ long and about 900 broad ; appearing black, but really dark olivaceous, obscurely marked on the back with black; body, antennæ and legs very sparsely hairy ; beak not reaching middle coxæ ; cauda broadly rounded ; antennæ 4-jointed, 3 and 4 annulate ; 3 much the longest.

The pupæ are about 1,200 μ long, deep olive-green ; beak not reaching middle coxæ ; antennæ six-jointed, 3 much longest, then 6 (the last two-fifths of which is narrowed); 4 and 5 cylindrical, about equal, together hardly as long as 3 ; 2 about as broad as long, its sides bulging. Larvæ greenish-yellow.

This insect may be called *Pemphigus Coweni*, in remembrance of Mr. J. H. Cowen's work on Colorado Aphididæ.

Cowen (Hemiptera of Colorado, p. 125) reports an aphid, which he describes but does not name, in galls on bearberry. I supposed that it must be the same as mine, but his description mentions honey-tubes, which are absent in my insect. His statement that the antennæ of the pupa are 7-jointed may possibly be due to the custom of counting the last joint as two.

CALIGRAPHA (CHRYSOMELA) PNIRSA.

It may be of interest to Coleopterists to know that the beautiful Chrysomelid, *Caligrapha pnirsa*, has been taken in considerable numbers at Rochester, Minnesota. One specimen was captured on May 30th, 1902, and another one seen, but not until the present year were more found. At the suggestion of Mr. Frederick Knab, of Urbana, Ill., who determined the species for me, I made careful search about basswood trees, and on May 30th, 1905, under the leaf-mould beneath these trees I unearthed a number of fine examples. A few weeks later others were taken as they were ascending basswood trunks about dusk, emerging from the ground apparently only under cover of darkness. I have been unable to find larvæ, nor has there been a trace of the species here since June.

If I have been correctly informed, this is the first authentic discovery of the species within the limits of the United States, although it is reported from several localities well north in Canada. It seems singular that a colony of a tree-inhabiting species so large and so well marked as *C. pnirsa* should be discovered here in the midst of a prairie country, unless, as may appear later, it exists in neighbouring States but has been overlooked.—Chas. N. Ainslie, Rochester, Minnesota

Mailed November 1st, 1905.

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THE INFLUENCE OF THE APIDÆ UPON THE GEOGRAPHICAL DISTRIBUTION OF CERTAIN FLORAL TYPES.

BY J. ARTHUR HARRIS, ST. LOUIS, MO.

(Continued from page 380.)

The distribution of the 16 genera and 376 species of the Dilleniaceous type is shown in table D.

TABLE D.

Dilleniaceous Type.

Region.	Genera.	Species.
1	4 = 25.00%	14 = 3.72%
2	2 = 12.50%	15 = 3.99%
3	10 = 62.50	220 = 58.50%
4	6 = 37.50%	75 = 19.95%
5	1 = 6.25%	3 = .77%
6	6 = 37.50%	22 = 5.85%
7	1 = 6.25%	7 = 1.86%
8	2 = 12.50%	6 = 1.60%
11	3 = 18.75%	8 = 2.13%
12	3 = 18.75%	6 = 1.60%

The differences observable in the percentages of this table and those obtained for the Solanum Cassia type are doubtless to be accounted for in part by the small number of genera and species.

Except for minor differences, the distribution of the 152 genera of the Melastomataceous type, all but three of which belong to the type family, is very similar to that of the Solanum-Cassia type.

TABLE E.

Genera of the Melastomataceous Type.

Region.	Endemic.	Others.	Total.
1	13 = 8.55%	6	19 = 12.50%
2	8 = 5.26%	2	10 = 6.57%
3	22 = 14.47%	9	31 = 20.39%
4	96 = 63.15%	1	97 = 63.81%
5	93 1.97%	1	4 = 2.63%
6		4	4 = 2.63%
12		6	6 = 3.94%
13	1 = .65%	0	1 = 6.65%

This type is confined to eight of the fourteen regions. Over 63 per cent. are found exclusively in the tropical American region. The distribution of the species has not been figured in detail, but about 73 per cent. are tropical American, and the remaining 27 per cent. are almost exclusively confined to the tropical African and Indian regions.

Aside from a comparison by species, which is at the present moment impracticable, a summation of the distribution of the genera of all types in comparison with the total number of genera of flowering plants will furnish the most satisfactory test of the hypothesis of the greater local differentiation of certain floral types. Table F makes clear the distribution of the 227 apically dehiscent genera of all three types.

TABLE F.

Summation of Genera, All Types.

Region.	Endemic.	Others.	Total.
1	16 = 7.04%	17	33 = 14.53%
2	9 = 3.96%	11	20 = 8.81%
3	34 = 14.97%	23	47 = 20.70%
4	116 = 51.10%	13	129 = 56.82%
5	5 = 2.20%	5	10 = 4.40%
6	13 = 5.72%	15	28 = 12.33%
7	4 = 1.76%	5	9 = 3.96%
8		4	4 = 1.76%
9		...	
10		2	2 = .88%
11		5	5 = 2.20%
12	1 = .44%	13	14 = 6.16%
13	1 = .44%	4	5 = 2.20%
14		1	1 .44%

These tabulations show that for endemic genera of all three types, regions 3, 4, 6 and 7 average 18.4 per cent., while the other ten regions average 1.3 per cent. For all genera of these three types, the four regions average 23.4 per cent., while the other ten regions average 4.1 per cent. A comparison with the distribution of all genera of flowering plants shows that the per cent. of endemic apically dehiscent genera in the four regions is 7.6 higher than that for all genera of plants, while for the other ten regions it is 1.3 lower. For all genera occurring, the per cent. of apically dehiscent genera is 1.7 higher for the four regions and 5.7 lower for the ten others. It will be seen that these figures become even more suggestive when the Indian region is not considered with tropical and extra-tropical South American and Australian regions. A comparison of the percents of this table with those for all genera of plants is facilitated by subtracting

the per cent. of all genera in the several regions from that denoting the apically dehiscent genera, and so representing the relative abundance of the latter in plus or minus quantities, as in table G.

TABLE G.

All Types. Relative Abundance.

Region.	Endemic.	Total.
1	+ .70	— 4.88
2	+ .93	— 1.00
3	+ 1.79	— 8.21
4	+ 28.06	+ 20.20
5	— 2.41	— 5.69
6	+ .53	— 1.20
7	— .28	— 4.01
8	— .27	— .69
9	— .04	— .29
10	— 5.32	— 14.03
11	— .79	— 5.02
12	— 1.56	— 5.74
13	— 3.84	— 11.92
14	— .85	— 8.07

The conclusions to be drawn from these figures seem clear and unmistakable.

Dalla Torre's Catalogus Hymenopterorum renders the large task of tabulating the distribution of the 137 genera of the Apidæ, and for comparison with them the 2,407 genera of Hymenoptera, including the Apidæ, relatively easy of accomplishment. The distribution of the insects is tabulated according to the same regions as the plants, merely for the purpose of direct comparison, and does not imply any taxonomic reasons for such an arrangement of the material. The distribution of the 137 genera of Apidæ is represented in table H, and that of the 2,407 genera of Hymenoptera in Table I.

TABLE H.
Genera of Apidæ.

Region.	Endemic	Others.	Total.
1		25	25 = 18.24%
2	3 = 2.19%	11	14 = 10.21%
3		23	23 = 16.78%
4	27 = 19.77%	37	64 = 46.71%
5		17	17 = 12.40%
6	12 = 8.76%	22	34 = 24.81%
7	15 = 10.95%	24	39 = 28.46%
8		4	4 = 2.91%
9		..	
10	4 = 2.91%	47	51 = 37.22%
11		38	38 = 27.73%
12		26	26 = 18.97%
13	4 = 2.91%	36	40 = 29.19%
14	4 = 2.91%	46	50 = 36.49%

TABLE I.
All Genera of Hymenoptera.

Region.	Endemic.	Others.	Total.
1	44 = 1.82%	173	217 = 9.01%
2	7 = .29%	85	92 = 3.82%
3	120 = 4.98%	268	388 = 16.12%
4	283 = 11.75%	462	745 = 30.95%
5	10 = .41%	122	132 = 4.51%
6	50 = 2.07%	186	236 = 9.80%
7	40 = 1.66%	130	170 = 7.06%
8	6 = .24%	45	51 = 2.10%
9		..	
10	125 = 5.19%	383	508 = 21.10%
11	14 = .58%	92	116 = 4.40%
12	29 = 1.20%	130	159 = 6.60%
13	210 = 8.72%	631	841 = 34.94%
14	699 = 29.04%	729	1428 = 59.30%

In endemic forms the per cent. of Apidæ in regions 4, 6 and 7 exceeds the per cent. of all Hymenoptera in those regions by 8, while for the

remaining eleven regions, of which seven—one of the seven being the Indian region—contain no endemic representatives of the family, it is 3.8 less than for the per cent. of all forms endemic. In all regions except the Antarctic some genera of the Apidæ are found, and are, indeed, distributed among the several regions with considerable uniformity. Tropical South America has 46.7 per cent., while the next largest number is that for the Mediterranean region, with 37.2 per cent., and the Northern region with 36.4 per cent. The average for the tropical and extra-tropical South American and Australian regions is 33.3 per cent., while for the other regions it is 19 per cent. The per cent. of all Apidæ occurring in 4, 6 and 7 exceeds the per cent. of all Hymenoptera in these regions by 17.4, while in the remaining eleven regions the per cent. of Apidæ occurring exceeds that for the total number of Hymenoptera by only 4.4.

As is well known to entomologists, the Hymenoptera are but little exploited systematically, and conclusions concerning their distribution must be only tentative. It is obvious from these tables that the data available upon the Hymenoptera are inadequate and unsatisfactory, and it will be many years before this vast group is sufficiently known systematically to justify any but tentative conclusions. Such data as we have, however, seem to point quite clearly to a great relative differentiation of the Apidæ in the regions in which our much more complete knowledge of the geographical distribution of plants has shown the apically dehiscent genera of the three types apparently adapted to pollination by the Apidæ to be most abundantly represented, and in view of the entire mass of evidence, it is difficult to refrain from the conclusion that there is a direct reciprocal relation between the distribution of the two classes of organisms. The evidence is at least so strong as to demand the co-operation of entomologists and botanists in the collection of data, which promises a better insight into some of the problems of taxonomy, biogeography and evolution.

One of the things which is most needed at the present time is a fuller knowledge of the insect visitors concerned in the pollination of flowers, especially of the flora of tropical regions, and while in many cases only the most careful investigations by one especially trained in floral ecology will yield satisfactory conclusions as to the stage of adaptation of a given species, it is also true that lists of visitors with some indication of their actions in visiting flowers such as can be easily prepared, and in many cases have been prepared, by the entomologist in his field studies, will enhance very greatly the value of his own publications, and will contribute much towards the data for larger problems.

NORTH AMERICAN TORTRICIDÆ.

BY PROF. C. H. FERNALD, AMHERST, MASS.

Eucosma Pergandeana, n. sp.—Expanse of wings, 16–20 mm. Head, palpi except a touch of fuscous on the outside, basal segment of the antennæ, white; flagellum of antennæ fuscous, annulate with white. Thorax varying from white to pale straw colour.

Ground colour of fore wings white or pale cream colour; the outer half of the costa with about eight oblique fuscous lines, which are lost in the fuscous dorsal portion of the wing. The remaining portion of the wing is streaked longitudinally with fuscous, but so diffuse as to render the lines very indistinct, and the surface behind and beyond the cell is nearly uniformly pale grayish fuscous in some specimens; the ocelloid patch near the anal angle is represented by fragments of three fine blackish lines, more or less obliterated and broken by a short vertical bar of more or less distinct metallic pale gray scales; a similar one beyond follows the outer margin and joins the first below, but is broken near the middle of its course. Fringe very pale gray, sprinkled with brownish atoms.

Hind wings pale gray, with a silken lustre; a little lighter beneath. Fringes white, with a very pale gray extra-basal line, not apparent in some specimens.

Abdomen above and beneath concolorous with the hind wings. Under side of fore wings fuscous except along the outer part of the costa, where they are lighter and reproduce the oblique stripes of the upper side.

Legs pale gray, with the tarsi of the middle and hind pair darker, and the tibiæ and tarsi of the fore legs also darker.

Described from thirteen males and three females before me, together with several others in too imperfect condition to include as co-types. They were captured as follows: Chicopee, Mass., June 21, 1896 (Knabb); Essex Co. Park, N. J., June 6, 1904 (Kearfott); Virginia, June 4, 1882 (Pergande); Toronto, Can., June 11–18, 1904 (H. S. Saunders); Texas; Loveland, Col., July, 1891 (Smith recd. from Lord Walsingham); Arizona.

The Arizona specimens and some of those from Colorado and Texas have the ground colour of the fore wings pale yellow or cream colour. This is not constant, but a gradation from one to the other, and therefore the subspecific name of *flavana* may be given to this form.

I have named this species after Mr. Theodore Pergande, of the Bureau of Entomology in the Department of Agriculture, Washington, D. C., from whom I received my first specimen, and for whose knowledge of insects and real worth as a gentleman, I have the highest respect.

Archips strianus, n. sp.—Expanse of wings, 21–25 mm. Head, thorax and fore wings very light wood-brown, with a slight tinge of pink in fresh specimens; palpi, collar and tegulæ marked more or less with dark brown.

Fore wings with dark brown intervenular stripes; the stripe from near the base of the wing to the end of the cell in front of the median vein, and also one from near the base of the subcostal to a little beyond the middle of the costa, is rather broad in the middle, and tapers toward each end; the three near veins 9, 10 and 11 are finer and nearly parallel; the stripes in front of veins 2 to 7 enlarge outwardly, and the first and last of these do not reach the cell, which has an oblique oval spot at the end in one example. There is a fine line along the fold not reaching the base of the wing, a more prominent line behind it from the base to the anal angle, and a wide stripe from the base to near the anal angle, leaving vein 1 between the two. Fringes fuliginous brown.

Hind wings fuliginous brown, with light stripes on the ends of some of the apical veins. Fringes much lighter than the wings, but with a dark dividing line.

Abdomen concolorous with the hind wings. Under side of all the wings somewhat lighter than above. and with the intervenular brown stripes more or less reproduced on the hind as well as the fore wings.

Described from one male from London, Ont., and one female taken in Franconia, N. H., by Mrs. Slosson, in my collection, and also one taken in Quebec by Mr. A. W. Hanham, in the National Museum.

Cydia imbridana, n. sp.—Expanse of wings, 11–19 mm. Head, palpi and thorax pale yellowish, with a brownish spot on the outside of the second segment of the palpi, and with an intermixture of brown hairs at the end of the same segment. There is a brownish stripe along the middle line of the thorax, and a broader one on the middle of the tegulæ.

Fore wings pale straw or pale sulphur yellow, with oblique brownish lines, which fuse more or less on the cell and back to the hind margin, leaving the costal and terminal portions lighter than elsewhere; a more or less distinct brown stripe extends obliquely from near the middle of the costa to the end of the cell, and thence with an irregular outline to the basal third of the hind margin; the outer half of the costa has four or five geminate lines with yellowish metallic scales between, extending towards the outer margin around the outside of the ocelloid spot, which has two or three horizontal, broken black lines on the surface, and is limited internally and externally with yellowish metallic scales. Fringes pale yellow, tipped with brown near the apex.

Hind wings fuscous; the fringes white, with an extra-basal fuscous line. Under side of hind wings much lighter than above. Under side of fore wings of the same colour as the hind wings above, but with the outer part of the costa whitish, and reproducing the markings of the upper side.

The above description was made from three males and four females. I have ten other more or less imperfect specimens which I have not included as co-types. They were captured as follows: Amherst, Mass. (L. W. Goodell); South Abington, Mass., Aug 10, 1880 (J. E. Bates); Essex Co. Park, N. J., Aug. 14 (Kearfott); Virginia, Aug. 30, 1883 (Pergande); Penn.; Onaga, Kan. (Crevecœur); Winnipeg, Man. (Hanham).

NOTES ON SOME JAMAICAN CULICIDÆ.

BY M. GRABHAM, M. A., M. B., GOVERNMENT MEDICAL SERVICE, JAMAICA, WEST INDIES.

1. The larva and pupa of *Uranotænia Lowii*, Theobald (Fig. 23). Collected from a pool covered with *Marsilia polycarpa*, Hooker, near the bridge over the Rio Cobre Canal, Spanish Town, Jamaica. Found in association with *Culex fatigans*, Wied., and *Celtia albipes*, Theo., January 1st, 1905. Seen in the breeding-jar, the larvæ assumed a horizontal position, just below the surface film, the extremity of the siphon alone being in contact with the surface film. They moved forward in sharp jerks quite unlike any other Jamaican Culicid.

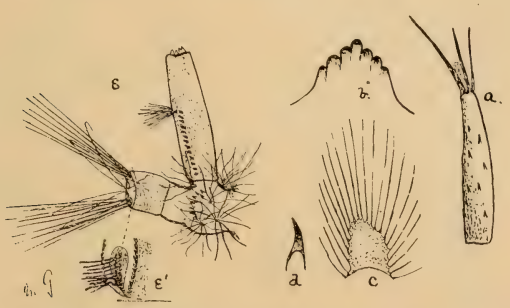


Fig. 23.—*a* antenna; *b* mentum; *c* scale of pecten; *d* scale of comb; *e* 8th and 9th abdominal segments; *f* plate of origin of ventral tuft of hairs.

Head.—Very dark brown, almost black; antennæ short, no lateral tuft; shaft with a few short spines; terminal spines three, one somewhat longer than the others, about two-thirds the length of shaft; an ovate lamina between the spines; mentum with seven rounded teeth. Thoracic and anterior abdominal hairs feathered; posterior abdominal hairs simple; a number of tufted hairs on the abdominal segments in addition to the lateral hairs, no tufted hairs observed on the thorax. Rays of tufts few, long, slender.

Tube.—Subcylindrical, five times as long as broad; pair of tufted hairs at the middle of posterior border. Pecten of tube with double row of twelve to fifteen scales, scales very thin laminæ, bordered with many fine hairs (much longer than serrations figured by Felt, New York State

Museum, Bull. 79, Ent. 22, p. 344, 1904, in *U. sapphirina*, Osten Sacken). Row of pecten scales reach from the base of tube up to level of tufted hairs. Upper scales overlap one another. Comb of eighth segment, an irregular row of eight to nine simple curved spines springing from a chitinous plate. Chitinous collar completely encircling ninth segment. Dorsal and ventral tufts of hairs spring from oval chitinous plates attached to collar by narrow isthmuses (similar plates are figured by Felt in *U. sapphirina*, Osten Sacken). Anal papillæ long, slender, divergent.

Pupa.—Thorax and abdomen with scattered tufted hairs. Siphons subcylindrical, about eight times as long as broad; bases deeply chitinized. Fins acuminate, mid-rib not projecting beyond border. Borders deeply serrated; two halves of fins very unequal.

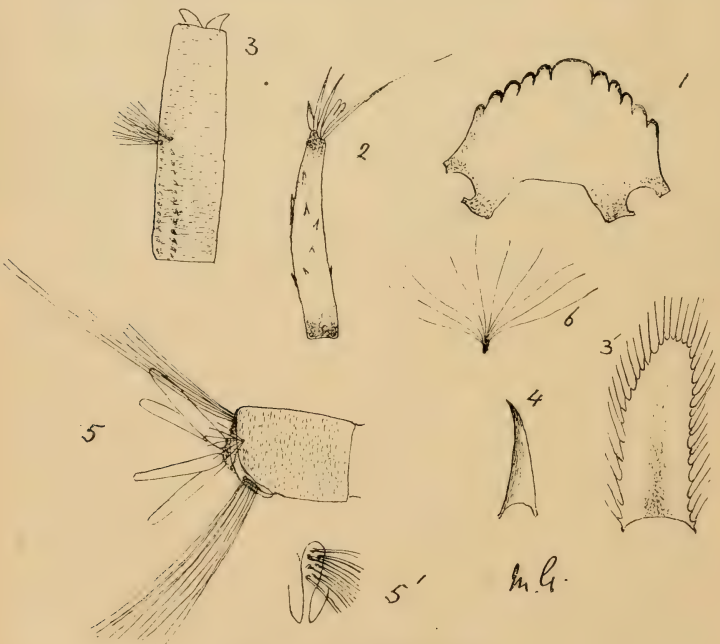


Fig. 24.—Uranotænia Socialis, n. sp., Theo.

2. Adult larva of *Uranotænia Socialis*, n. sp., Theo. (Fig. 24). Collected at Rockport, near Kinpta, Jamaica, in permanent pools, in association with *Cellia albipes*, Theo., and *Melanoconion atratus*, Theo. March and April, 1905.

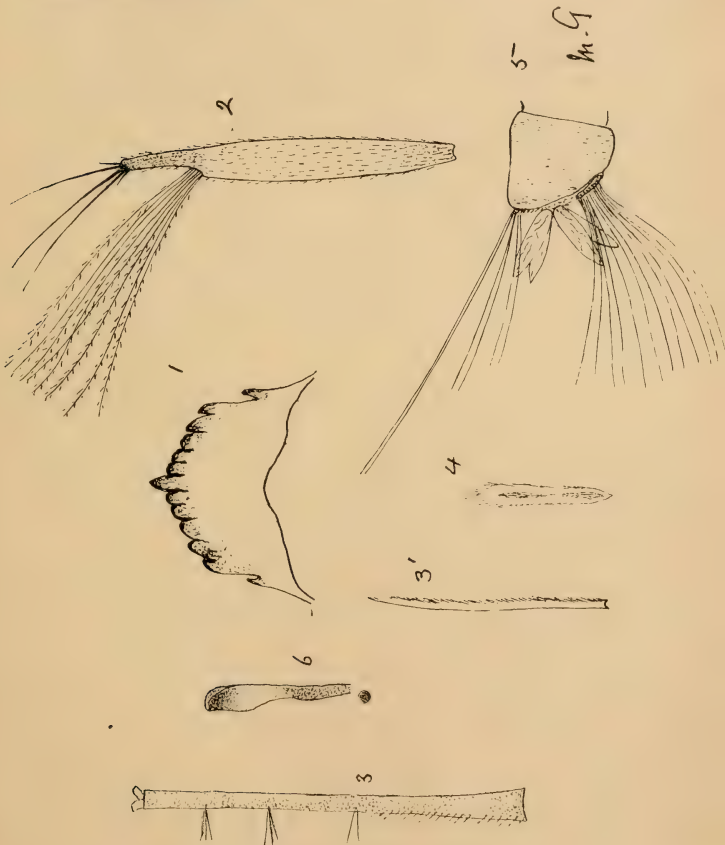


Fig. 25.—Melanoconion atratus, n. sp., Theo.

The adult larva at rest lies horizontally just under the surface film, and moves forward in spasmodic jerks. Thorax and abdomen sparingly covered with tufted hairs (6). Mentum stout, teeth eleven in number, apical tooth broad and flat (1). Antennæ with lateral hair tufts; three terminal hairs, innermost longest, ending in long thread; a lanceolate and a bilobed blade between hairs (2). Siphon nearly cylindrical, about four times as long as broad, a pair of tufted hairs at the middle of the posterior border. Pecten of 10–12 very thin scales bordered with fine hairs, each scale somewhat thickened in the centre. Row of scales reaches half way up tube (3.3′). Comb of 7 short, stout, curved spines, in a single curved row (4). Anal papillæ small. Ventral and dorsal tufts of hairs spring from spatulate processes attached to the main chitinous band by long, narrow isthmuses (5.5′). Chitinous collar complete.

3. Adult larva of *Melanoconion atratus*, n. sp., Theo. (Fig. 25). Small transparent hairy larvæ, with very delicate elongated siphons, abounding in pools in mangrove swamps. Collected all the year round. Mentum of 13 teeth; apical tooth elongated (1). Antennæ proportionately large; lateral hair tuft of many long feathered hairs; terminal hairs long and stout (2).

Siphon many times longer than broad, slightly constricted in the middle, with several pairs of tufted hairs along the posterior border. Row of pecten occurring along lower third. Scales about 20, long and delicate, with many fine hairs along the concave border (3.3′). Comb of numerous flattened elongated scales bordered with fine setæ (4). Anal papillæ small. Ventral tuft of hairs springing from separate plate (5). Chitinous collar complete. Siphons of pupa deeply chitinized at apices (6).

4. Adult larva of *Culex confirmatus*, Arr. (Fig. 26). Dark brown (nearly black), very active, voracious larvæ found in fresh water pools at the Rio Cobre Canal Dam, near Spanish Town, Jamaica, January 17th, 1905. Abdomen and thorax thickly covered with small spines (1). Mentum a wide angle of about 40 teeth (2). Antennæ short and stout; lateral tuft at the middle, of three hairs. Terminal hairs three in number, several shorter spines and a wedge-shaped lamella (3). Siphon about 1½ times as long as broad; a tufted hair at the posterior border near the apex. Row of pecten 15–20 strong spines, each with several smaller teeth at the base (4.4′). Comb of 20–25 short oval scales in a triangular patch; each scale bordered with numerous fine setæ (5). Anal papillæ lanceolate, nearly as long as the ventral tuft (6). Hairs of the ventral tuft spring from a separate plate. Chitinous collar of ninth segment complete.

Eggs elongated, laid separately on the surface of the water, papillæ narrow, long, flattened, parallel cells (7.7').

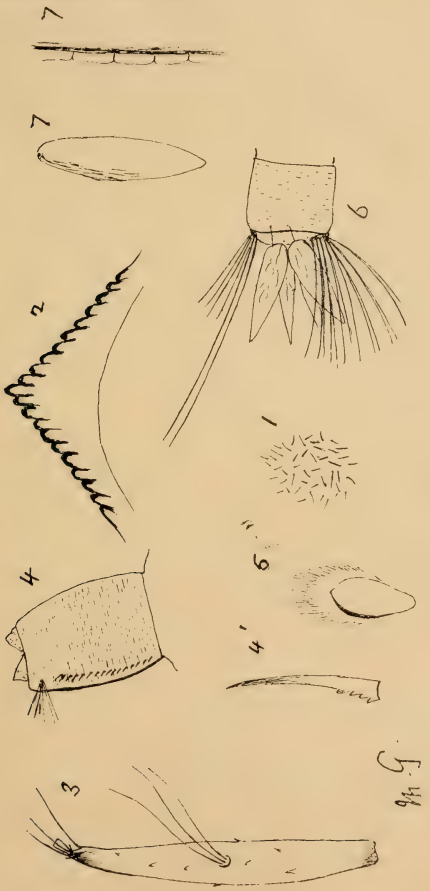


Fig. 26.—Culex confirmatus, Arr.

Adult larvæ of *Culex janitor*, Theo. (Fig. 27). Collected with *Deinocerites cancer*, Theo., from crab holes along the sea shore. The

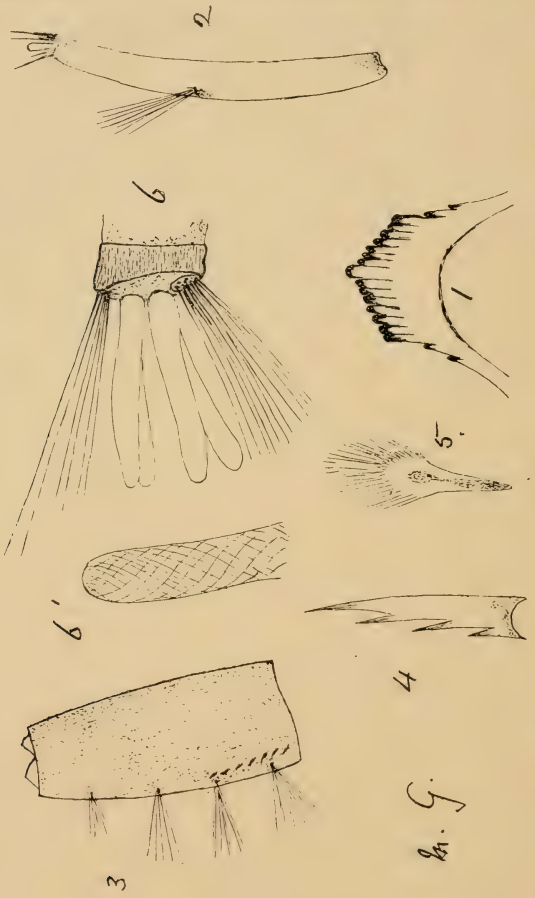


Fig. 27.—Culex janitor, Theo.

water in the holes is brackish. Larvæ abundant after seasonal rains in May and October. Mentum with steep sides ; summit a wide angle of 15 rounded teeth (1). Antenna : shaft stout, quite smooth, devoid of spines; lateral hair tuft arising from the middle, composed of a few short, fine, simple hairs ; terminal hairs short, three somewhat larger than the others, a flattened lamella between them (2). Siphon 2½ times as long as broad; four pairs of tufted hairs along posterior border, lowest pair arising quite near base (3). Row of pecten of seven toothed spines (4). Comb of 70–80 small scales arranged in a triangle, scale bordered with many fine hairs, shaft thickened along the centre (5). Narrow chitinous collar completely encircling ninth segment (6). Basal tuft of hairs arising from a separate plate. Anal papillæ cylindrical, rounded at the free ends, thickened by spiral interlacing strands of chitin (6′). *Eggs* laid in rafts.

6. Adult larva of *Culex microsquamosus*, n. sp., Theobald (Fig. 28). Collected in algæ-covered pools at the Rio Cobre Canal Dam, near Spanish Town, Jamaica, January 17th, 1905. Mentum a wide angle of many teeth, one of the outer teeth on each side rising considerably above the others (1). Antennæ stout and relatively large, lateral tuft of many feathered hairs. Apical hairs simple, 2 long, 2 short, a wedge-shaped lamella at apex (2).

Siphon many times longer than broad, in adult larvæ as long as the thorax and abdomen, slightly curved forward in its upper half; row of pecten in lower third of 15–18 scales, each scale a flattened lamella with 5–6 terminal serratures and 2–3 basal ones. Four bifid hairs along posterior margin of tube increasing in size from above downwards (3.3′). Comb of 30–40 delicate scales in a rough triangle, each scale bordered with fine hairs along the free margin (4). Anal papillæ ovate, nearly as long as ventral hair tuft (5). Chitinous collar of ninth segment complete, broad. *Eggs* laid in rafts.

Mosquitoes bred from these larvæ were forwarded to Mr. Theobald, who has kindly sent me the following description :

" *Culex microsquamosus*, n. sp.—Thorax clear bright brown, unadorned, pleura pale gray. Proboscis indistinctly pale-banded in the middle. Abdomen deep blackish, with basal pale bands. Legs deep brown, unbanded ; base and venter of femora gray ; apex of hind tibiæ pale. Palpi of male acuminate, last two segments hairy, jet black, remainder mostly ochraceous brown. Male genitalia with three flattened spines and one foliate plate on the inner lateral process.

" ♀.—Head deep brown, with narrow curved pale grayish scales and black and deep ochraceous upright forked ones, some small gray flat scales

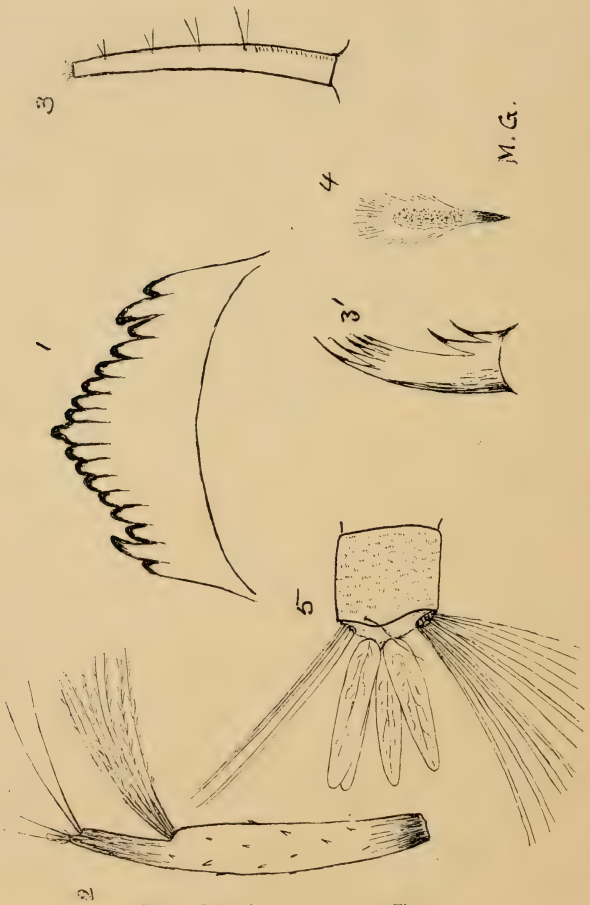


Fig. 28.—Culex microsquamosus, n. sp., Theo.

laterally. Clypeus brown. Proboscis black, showing a pale, indistinct median area in some lights. Palpi short, black-scaled, testaceous in the middle owing to a bare area. Antennæ deep brown. Thorax clear brown, scantily clothed with very small narrow curved pale bronzy scales (in some lights the metanotum is deeper brown); scutellum paler, gray in some lights, with small narrow curved bronzy-brown scales and rather long deep-brown border bristles, eight to the mid-lobe; metanotum ochraceous-brown to brown; pleura pale shiny gray, with some rows of small black bristles.

"Abdomen deep blackish brown, with basal pale bands to the third, fourth, fifth and sixth segments, traces on the seventh, pronounced on the eighth; the first segment is nude, shiny, testaceous, with brown hairs and two small median patches of black scales, border bristles pale ochraceous.

"Legs deep brown, unbanded; base and venter of femora gray, also to some extent the venter of the tibiæ and some pale scales beneath the tarsi. Apex of hind tibiæ with a pale spot, femoral and tibial hairs pallid; ungues small, equal, simple, much curved. Hind tibiæ and metatarsi about equal. Wings with typical Culex scales; first submarginal cell considerable longer and a little narrower than the second posterior cell, its base near the base of the wing, its stem one-third of the length of the cell; second posterior cell small, its stem about two-thirds the length of the cell; lower branch of the fork much curved; posterior cross-vein rather longer than the mid, not quite its own length distant from it; median vein-scales on the third rather large and dusky. Halteres with white stem and fuscous knob, sharply contracted. Length 4 mm.

"♂ similar to ♀. Palpi with acuminate apical segment, the last two and apex of the antepenultimate segment black, with black hair tufts, remainder of palpi brown. Proboscis deep brown, with an indistinct broad median pale band. Fork cells small, the first submarginal longer and narrower than the second posterior cell, its base nearer the base of the wing; the stem about two-thirds the length of the cell; stem of the second posterior nearly as long as the cell. Ungues of the fore and mid legs unequal, uniserrated; hind equal and simple. Genitalia with sickle-shaped claspers, internal prominence with three thick flat spines, the mid broadest, the smallest not hooked at the apex, foliate plate acute apically, with a prominent curved spine over its base (Fig. 29). Length 4 mm.

"*Observations.*—It comes very near *C. fatigans* and its allies, but the male genitalia differ, and the small thoracic scales at once separate it.

The form of the first fork-cell varies. A very marked *variety* occurs, in which the abdominal banding is almost absent. This variety shows a few pale scales on the apical borders of some of the segments, and the posterior border-bristles on the mid-lobe of the scutellum are seven in number. The characters are not sufficient to separate it as a distinct species, and the male sent with it exactly resembles that of the type. Another speci-

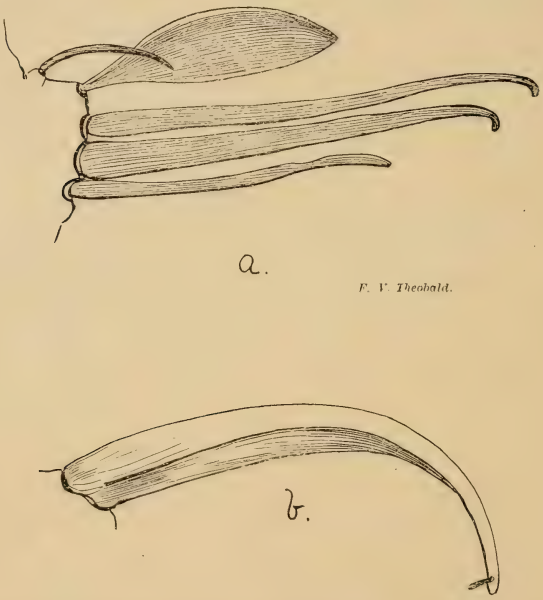


Fig. 29.—Culex microsquamosus, n. sp., Theo. *a* Internal lateral process of basal lobe; *b* clasper.

men differs from the type in the rather more elongate form of the wing, but resembles it in all other features, and cannot be separated."

Janthinosoma Johnstonii, n. sp.—Head covered with broad pale yellow and violet spindle-shaped scales; a cluster of black bristles between the eyes; a group of upright black forked scales at the back of the head. Eyes deep reddish-purple, bordered posteriorly by a row of white scales. Proboscis and palpi black, covered with black scales with violet reflections,

Clypeus black. Prothoracic lobes with white scales and long black bristles. Mesothorax covered with creamy white spindle-shaped scales on a black background; scales arranged more thickly on the lateral areas; a number of black bristles scattered over the mesothorax, especially abundant on the postero-lateral areas. Pleura with silvery scales and golden hairs. Scutellum with white scales and a median and two lateral groups of numerous long black bristles. Metathorax black.

Abdomen violet, basal segment with pearly-white scales and golden bristles; next five segments with lateral apical white-scaled areas; numerous black hairs scattered over the segments. Venter white scaled, with narrow basal bands of violet scales. Legs with metallic violet reflections, base and most of the venter of femora yellow scaled; knee spot white, small; third hind tarsus completely white except a few apical black bristles. Ungues all equal and uniserrate. Wings with the first submarginal cell a little longer and nearly as broad as the second posterior cell, its stem the same length as the cell; stem of the second posterior about as long as the cell; halteres with stem and knob pale yellow. Length 4.5 mm.

Observations.—Described from four ♀'s taken on a horse at the foot of the Red Hills, 5½ miles along the Molynes Road, Kingston, Jamaica, early in July, 1905. Found in association with the brilliant *J. discrucians*, Walker. It is apparently closely allied to *J. Arribalzagæ*, Giles, from which it may be distinguished by its wing venation, scutellar bristles and white third hind tarsus.

WHAT IS EUCHŒCA COMPTARIA, WALKER?

BY GEORGE W. TAYLOR, WELLINGTON, B. C.

In 1874 Dr. Packard[1] described two nearly allied species of Geometrid moths, one as *Larentia duodecimlineata*, the types being from California, and the other as *Larentia perlineata*, from New York. There can be no doubt, I think, as to the insect he had before him when describing *perlineata*. That species seems to be a distinct and easily recognized one, although there is a pretty and not uncommon variety of it which is sometimes confused with *Euchœca lucata* by those who are not very familiar with this group of moths.

We cannot so readily determine what the type of *12-lineata* was, because there are two species very similar in outward appearance, though belonging, it would seem, to different genera, occurring in California, whence

1. Proc. Boston Soc. Nat. Hist., XVI, 19, 1874.

Packard's type specimens came. We are indebted to Dr. Pearsall[2] for discriminating these two forms, and he has, quite rightly, I think, placed one in the genus *Euchœca*, and for the other has established the new genus *Nomenia*.

I may remark here that I have never refused, as Dr. Pearsall asserts,[3] to accept the genus *Nomenia*. On the contrary, I am satisfied that it is a perfectly valid one, and I have now in my own cabinet a fair series of both males and females of the type species, but I still think, as I stated in a previous paper, that it is not quite clear whether Packard, when describing *12-lineata*, had before him the *Nomenia* or the *Euchœca*, and that, therefore, until the point has been settled by the examination of the actual types, it cannot be certain to which form Packard's specific name should be applied.

Now, Walker[4] in 1860 described a moth from Nova Scotia as *Tephrosia ? comptaria*.

This species was not identified in American collections until 1895, when Dr. Hulst,[5] after inspecting the type specimen, pronounced it to be the *Larentia perlineata* of Packard, and in consequence the name *perlineata* has been dropped from our lists.

Quite recently, however, as I stated in my last note to this journal,[6] Mr. L. B. Prout, who has gone to a great deal of trouble to compare for me American material with Walker's types in the British Museum, has informed me that in this particular determination Hulst was in error, for that *comptaria*, Walker, equals *12-lineata*, Pack., not *perlineata*. Having great confidence in the carefulness and good judgment of my friend, I therefore list our species as follows :

Nomenia 12-lineata? Packard.
Euchœca comptaria, Walker.
= 12-lineata, Auct. pars.
= salienta, Pearsall.
Euchœca perlineata, Packard.

These entries to replace Nos. *3330* and *3331* in Dyar's Catalogue.

Dr. Pearsall disputes this arrangement, and writes :

2. Canadian Entomologist, XXXVII, 125, April, 1905.
3. Canadian Entomologist, XXXVII, 331, September, 1905.
4. Cat. Lep. Het. Brit. Mus., XXI, 406, 1860.
5. Entomological News, VI, 70, March, 1895.
6. Canadian Entomologist, XXXVII, 240, July, 1905.

Nomenia 12-lineata, Packard.

Euchœca salienta, Pearsall.

= 12-lineata, Auct. pars.

Euchœca comptaria, Walker.

= perlineata, Packard.

He argues in favor of this course in an article in this journal[7] headed "Whom shall we follow?" and decides that so far as he himself is concerned he will follow Dr. Hulst rather than Mr. Prout.

Dr. Pearsall's contention seems to be, that as Hulst has so long been our authority on North American Geometridæ, his word must be taken until it can be shown that Mr. Prout and myself are more likely to be right.

Of course one recognizes that this line of argument would be the sound one in many, perhaps in most, cases, but in this particular instance I believe Mr. Prout is right and Dr. Hulst wrong, and so, while admitting the latter's great authority, I shall not follow him, 1st, because the conclusions of Mr. Prout were arrived at after a very careful study and a more prolonged study than Hulst could possibly have given this one insect, and with a full knowledge of the different opinion Hulst had expressed; and 2nd, because in all the rest of the synonomy given by Hulst under the species we are considering, the Doctor is entirely and manifestly wrong, showing that he was not specially well informed as to this species or group of species.

I ask, will Dr. Pearsall follow Hulst and accept the other synonyms placed with *perlineata* under *comptaria*, Walker?

One of them is *condensata*, Walker, which should be placed under *Euchœca lucata*, Guenée. The other is *inclinataria*, Walker, of which the type (as a glance at the description will show, and as Hulst himself once declared[8]) is a specimen of *Xanthorrhoe ferrugata*, a species with fully pectinated antennæ, and hardly to be confused with *comptaria* by the veriest tyro.

I argue then that if Dr. Hulst was wrong in two cases out of three, I am justified in taking my friend's opinion rather than his in the third instance.

7. Canadian Entomologist, XXXVII, 331, September, 1905.

8. Entomological News, VI, 70, March, 1895.

CATALOGUE OF THE GENERA OF THE HEMIPTEROUS FAMILY APHIDÆ, WITH THEIR TYPICAL SPECIES, TOGETHER WITH A LIST OF THE SPECIES DESCRIBED AS NEW FROM 1885 TO 1905.

BY G. W. KIRKALDY, HONOLULU.

It is now twenty years since the lamented Jules Lichtenstein published the first—and, unfortunately, last—part of his proposed monograph of the Aphidæ (a). This instalment contained a list, without references, of the genera and species known to Lichtenstein, but, as will be seen from the following pages, a large number of names was omitted and some were misapplied, so that a new list of genera should be useful, having regard to the interest and importance of the family. As the Aphid volume of Lethierry and Severin's "Catalogue général des Hémipterès" may be expected to appear within a few years, I have not added a list of all the species; those, however, described since Lichtenstein's Monograph, are now enumerated.

This list was prepared originally for my own use in studying the Hawaiian Aphid fauna, all the forms of which are introduced, and, indeed, but few in number. The differences of opinion as to the validity of certain generic conceptions are so varied that it may well be that mistakes have been made here in this connection, as I can scarcely find two authors agreeing in their conception of what constitutes a genus in this family.

The works cited are almost all in my own library, and I am therefore responsible for the accuracy of the references, except in a few cases marked †.

The following abbreviations will materially shorten the paper.

Ann. Belg. = Annales de la Société Entomologique de Belgique.

Ann. France = Annales de la Société Entom. de France.

Bull. France = Bulletin de la Société Entom. de France.

Bull. Ital. = Bulletino Soc. Entom. Italiana.

Cowen Colorado = Cowen, in Bull. Colorado Agr. Exp. Sta., 31.

Hunter Bull. Iowa = Hunter, in Bull. Iowa Agr. Coll. Sta., 60.

Lichtenstein Mon. peup = †Lichtenstein, Monographie des pucerons du peuplier.

Oestlund Bull. = Oestlund, Bull. Geol. Survey, Minnesota IV.

Oestlund Report = Oestlund, 14th Ann. Rep., Geological Survey, Minnesota.

(a) "Les Pucerons. Monographie des Aphidiens," pp. 1–188, Pls. I–IV (coloured). Montpellier, 1885.

N. B.—1. The "Zoological Record" and "Bericht der Entom." incorrectly cite the source of Zehntner's papers, giving only the "separate" pagination and source. There are in Java numerous experiment stations, with entomological staff, etc.; the results of their researches, entomological, chemical, agricultural, are mostly published in the "Archief voor de Java-Suikerindustrie," a periodical now in its 13th year, but which apparently finds its way to very few American or European libraries. The entomological contributions, however, are distributed by their authors, separately paged and as "contributions" to their particular experiment station, the plates being unnumbered or with the numbers of the original impress. For instance, *Aphis adusta* was described (on p.?) of the 5th vol. of the "Archief" (1897) and reissued separately paged in the "Mededeelingen van het Proefstation Oost-Java, niewe serie No. 37." It is these latter references that are quoted in the "Record" and "Bericht."

I am a little uncertain of the exact dates of Koch's genera. The "Bericht" states, heft 1–4 (1854); 5–7 (1855); 8–9 (1856); the rest 1857. Heft 8 began p. 237, but I am not quite certain where heft 9 finished.

N. B.—2. "Kholodkovsky" is also written "Cholodkowsky."

Subfamily *Aphinæ* (b).

1. Macrosiphum, Passerini, 1860, Gli Afidi, 27, t. *rosæ* (L.), Pass.
 = ‖Siphonophora, Koch, 1855, Pflanzenläuse, 150.
 = Nectarophora, Oestlund, 1887, Bull. Minn., 78
2. Drepanosiphum, Koch, 1855, Pflanzenläuse, 201, t. platanoides, Koch, Licht.
 = ‖Drephanosiphum, Hunter, 1901, Bull. Iowa. 91.
3. Phorodon, Passerini, 1860, Gli Afidi, 27, t. *humuli* (Schrank), Pass.
4. Nectarosiphon, Schouteden, 1901, Ann. Belg., XLV, 112.
 = ‖Macrosiphum, Oestlund, 1886, Rep. Minn., 27, t. *rubicola* (Oestl.)
5. Megoura, Buckton, 1876, Mon. Aph., I, 188, t. *viciæ*, Buckt (c).
6. Rhopalosiphum, Koch, 1854, Pflanzenläuse, 23, t. *nymphææ* (L.) Gerst.
 = Siphocoryne, Passerini, 1860, Gli Afidi, 28, t. *nymphææ* (F.), Pass.
 = †Liosomaphis, Walker, 1868, Zoologist, 1119 (inedit ?).
 = Amphorophora, Buckton, 1876, Mon. Aph., I, 187, t. *ampullata*, Buckton.
 = Rhopalosiphon, Scudder, 1882, Nomencl. Zool., I, 294.

(b) The probable origin of the word "Aphis" does not allow of the forms Aphidinæ, etc.

(c) Kholodkovsky regards this as a syn. of No. 6.

7. Monellia, Oestlund, 1887, Bull. Minn., IV, 44, t. *caryella* (Fitch), Oestlund.
8. Calaphis, Walsh, 1862, Pr. Ent. S. Philad., I, 301, t. *betulella*, Walsh.
9. Mastopoda, Oestlund, 1886, Rep. Minn., 52, t. *pteridis*, Oestl.
10. Myzus, Passerini, 1860, Gli Afidi, 27, t. *cerasi* (F.), Pass.
 = Mysus of some lists.
 = Ceylonia, Buckton, 1891, Ind. Mus. Notes, II, 35, t. *theæcola*, Buckton.
11. Hyalopterus, Koch, 1854, Pflanzenläuse, 16, t. *pruni* (F.), Pass., 1860.
 = Hyalopteris, Hunter, 1901, Bull. Iowa, 92.
12. Toxoptera, Koch, 1856, op. c., 253, t. *aurantiæ*, Koch.
13. Aphis, Linné, 1758, Syst., Nat. Ed., X, 451, t. *sambuci* (L.), Lam., 1801.
 = †Loxerates, Rafinesque, 1818, Amer. Monthly Mag., III, 16.
14. Hyadaphis, Kirkaldy, 1904, Entomologist, XXXVII, 279, t. *hyadaphis*, n. n. (= ‖*xylostei*, Schrank).
 = ‖Siphocoryne, Passerini, 1863, and authors (not Passerini, 1860).
15. Pterocomma, Buckton, 1879, Mon. Aph. II., 142, t. *pilosa*, Buckton.
16. Aristaphis, n. n.
 = ‖Cladobius, Koch, 1856, Pflanzenläuse, 251, t. *populea* (Kalt.)*.
 = ‖Aphioides, Passerini, 1860, Gli Afidi 28.
17. Melanoxantherium, Schouteden, 1901, Ann. Belg., XLV, 113.
 = ‖Melanoxanthus, Buckton, 1879, Mon. Aph., II, 21, t. *salicis* (L.) Buckt. (d)
18. Brachycolus, Buckton, 1879, Mon. Aph., II, 146, t. *stellariæ* (Hardy), Buckton.
19. Cryptosiphum, Buckton, 1879, op. c., 144, t. *artemisiæ*, Buckton.
20. Pergandeida, Schouteden, 1903, Zool. Anz., XXVI, 686, t. *ononidis*, Schout.
21. Microsiphum, Kholodkovsky, 1902, Isviestiya S. Peterb. Liesn. Instit., 53, t. *ptarmicæ*, Khol. (e).

(d) According to the Zool. Record (which gives a reference to P. E. S., Wash., II, 517, instead of †P. Ac., Wash., II, 517), Pergande regards 15, 16 and 17 as one genus; Kholodkovsky regards *Pterocomma* as a synonym of *Chaitophorus*.

(e) This is not recorded in "Zool. Record." I have only a separately paged, undated copy before me, and I am indebted to the "Rysskoye Entom. obosriniye," III, 149 (1903), for the reference.

22. Chaitophorus, Koch, 1854, Pflanzenläuse, p. 1, t. *populi* (L.), Gerst.
=||Chætophorus of many lists.
=||†Phyllophorus, Thornton, 1852, Tr. Micr. Soc., Lond., p. ?, t. *testudinarius*.
=†Phyllophora, Fernie, 1852, Morris Nat., II, 265, *testudinacea*.
=||†Chelymorpha, Lane Clark, 1858, The Microscope, p. ?, t. *phyllophora*, Clark [=*aceris* (L.)].
=†Periphyllus, Van der Hœven, 1863, Tijdschr. Ent., VI, 7, t *testudo*, Hœven [=*aceris* (L.)].
=†Arctaphis, Walker, 1870, Zoologist, 2000 (? inedit).
=Rhyllophorus (!) Scudder, 1882, Nomencl. Zool., I, 246.

Subfam. 2.—*Callipterinæ*.

23. Bradyaphis, Mordvilko (f).
24. Sipha, Passerini, 1860, Gli Afidi, 29, t. *glyceriæ* (Kaltenbach), Pass.
25. Callipterus, Koch, 1855, Pflanzenläuse, 208, t. *juglandis* (Kalt.), Pass., 1860.
=Pterocallis, Passerini, 1860, Gli Afidi, 28, t. *alni*, Pass., =*maculata*, Heyden.
=||Ptychodes, Buckton, 1881, Mon. Aph., III, 39, t. *juglandis* (Kalt.), Buckt.
=Panaphis, Kirkaldy, 1904, Entom. XXXVII, 279.
26. Kallistaphis, n. n., t. *betulicolæ* (Kalt.).*
=||Callipterus, Buckton, 1881, Mon. Aph. III, 12 (not containing Koch's type).
27. Myzocallis, Passerini, 1860, Gli Afidi, 28, t. *coryli* (Goetze), Pass.
=Mysocallis Rondani, 1874, Bull. Ital. VI., 62 (g).
28. Phyllaphis, Koch, 1856, Pflanzenläuse 248, t. *fagi* (L.), Koch.
=Phillaphis of some lists.
29. Symydobius, Mordvilko (h).

(f) I cannot trace this. Kholodovsky (1898) in a Forestry paper issued (separately? or perhaps in the Isviestiya S. Peterb. Liesn. Instit. ?), under the title "Obyasnityelny Katalog Kollyektsy tlyei (Aphidæ)," described it in an analytical table, but without mention of species (p. 6). It is omitted in the later 1902 paper.

(g) Kholodkovsky considers 25, 26 and 27 to be only one valid genus.

(h) Included by Kholodkovsky & Schouteden in their paper, but without reference—I cannot trace it.

30. †Pterochlorus, Rondani, 1847, Nuov. Ann. Sci. Nat. Bologna (2) VIII, p. ? type || *roboris* Rond. = *longipes* Duf.
Subj. 1. Dryaphis, Kirkaldy, 1904, Entom. XXXVII, 279, type *roboris* (L.).*
= ||Dryobius, Koch, 1855, Pflanzenläuse, 225, t. *roboris* (L.)

Subfamily 3.—*Lachninæ.*

31. Asiphum, Koch, 1856, Pflanzenläuse, 246., t. *ligustrinellum* (Koch), Lichtenstein, 1885.
32. Stomaphis, Buckton, 1883, Mon. Aph. III, 61, t. *quercus.*
33. Lachnus, Burmeister, 1835, Handbuch Entom. II, 91, t. *pinicola* (Kalt.), Pass.
= Cinara, Curtis, 1835, Brit. Entom., 576, t. *pini*, Curtis.
34. Paracletus, Heyden, 1837, Mus. Senckenberg II, 295, t. *cimiciformis* (Kalt.), Heyden.
35. Trama, Heyden, op. c., 293, t. *troglodytes*, Heydèn.

Subfamily 4.—*Eriosomatinæ.*

36. Eriosoma, Samouelle, 1819, Entom. Useful Compendium 232, t. *mali* [= *lanigera*, Hausm.]
= †Myzoxyle, Blot., 1824, Mem. Soc. Linn., Calvados, I, p. ?
= †Myzoxylus, Blot., 1830, Mem. Soc. roy. agr., Caen. III, 332.
= †Myzoxile, Avrilly, 1834, Du Myzoxile, p. 1 (t. of these three = *lanigera*).
37. Schizoneura, Hartig, 1841, Zeitschr, Entom. III, 365, t. *ulmi* (L.), Pass, 1860.
= †Mimaphidus, Rondani (ref.).
38. Anoecia, Koch, 1857, Pflanzenläuse, 275; t. *corni.*
=Anooecia, Buckton, 1881. Mon. Aph., III, 108.
39. Mindarus, Koch, 1857, Pflanzenläuse, 277, t. *abietinus* (i).
40. Schlechtendalia, Lichtenstein, 1884, Stettin Ent. Zeit., XLIV, 242, t. *chinensis.*
41. Pachypappa, Koch, 1856, Pflanzenläuse, 269, t. *marsupialis.*
=Pachypapa of some lists.
=Pacyhpapa (!) Lichtenstein.
42. Colopha, Monell, 1877, Canad. Ent. IX, 102, t. *ulmicola.*
43. Phloeomyzus, Horváth, 1896, Wien. Ent. Zeit. XV, 5, t. *passerinii* (Lichtenstein), Horv.
= ||†Löwia, Lichtenstein, 1886, Mon. peupl., 37, t. *passerinii* (Sign.), Licht.

(i) Kholodkovsky considers 36, 37, 38 and 39 to form one genus.

44. Tetraneura, Hartig, 1841, Zeitschr, Entom. III, 365, t. *rugicornis*, Hartig.

45. Geoica, Hart, 1894, 18th Rep. State Ent., Illinois, 101, t. *squamosa*, Hart (k).

46. Hormaphis, Osten Sacken, 1861, Stettin Ent. Zeit. XXII, p. 422, t. *hamamelidis*.

47. Byrsocrypta, Haliday, 1839, Ann. Nat. Hist. II, 190, t. *bursaria* (Linn.), Hal.
= Brysocrypta, Westwood, 1839, Intr. Mod. Class. Ins. Synopsis, 118.
= Pemphigus, Hartig, 1841, Zeitschr. Ent. III, 365, t. *bursaria* (Linn), Pass., 1860.
= Pemphilus (!) Kaltenbach, 1843, Monographie, 180.
= †Aphioides, Rondani, 1847, Nuovi Ann. Sci. Nat. Bologna (2), VIII, 439, t. *bursaria* (L.), Rond.
= †Baizongia, Rondani (? ref.).
= Thecabius, Koch, 1857, Pflanzenläuse, 294, t. *populneus*.
= Melaphis, Walsh, 1866, Proc. E. S , Philad., VI, 281, t. *rhois* (Fitch).*

48. Stagona, Koch, 1857, op. c., 284, t. *xylostei*, Koch.

49. Holzneria, Lichtenstein, 1875, Bull. France (5) V., p. LXXVI, t. *poschingeri* (Holzner), Licht.

50. Prociphilus, Koch, 1857, Pflanzenläuse, 279, t. *bumeliæ* (Schr.).

51. Rhizobius, Burmeister, 1835, Handb. Entom. II, 87, t. *pilosellæ*, Burm.*
= Rhizophthiridium, Vanderhœven, 1849, Handb. Dierkunde I, 508 [n. n. for Rhizobius].
= Rhyzoicus, Passerini, 1860, Gli Afidi, 30, t. *sonchi*, Pass. (l).

52. †Rhizoctonus, Mokrzhetsky, 1897, Trudy Russk. Entom. XXX, 438, t. *ampelinus* [genus not separately described; the first separate description was probably by Kholodkovsky, 1898, Forestry work already cited; there he attributes the genus to Horváth].

53. Aploneura, Passerini,† 1863, Arch. Zool. II, p. ?, t. *lentisci*.
= Haploneura of some lists.

54. Vacuna, Heyden, 1837, Mus. Senckenberg II, 289, t. *coccinea*.
= Thelaxes, Westwood, 1839, Intr. Mod. Class Ins., Synopsis 118, t. *quercicola*, Westw.

(k) Horvath considers 44 and 45 one genus.

(l) Kholodkovsky considers 48, 49, 50 and 51 as synonyms of 47.

55. Glyphina, Koch, 1856, Pflanzenläuse, 259, t. *betulæ* (Kalt.), Koch. (m).

56. Ceratapis, Lichtenstein, 1882, Bull. France (6), II, p. XVI, t. *lataniæ* (Boisd.), Licht.

= ||Boisduvalia, Signoret, 1868, Ann. France (4), VIII, 400, t. *lataniæ* (Boisd.), Sign., [nom. nudum].

= Ceratovacuna, Zehntner, 1897, Archief Java Suikerindustrie, V, No. 10, p. ?, t. *lanigera*, Zehntner (n).

= Ceratophis (!) Hempel, 1902, Ann. Mag. Nat. Hist. (7), IX, 400.

(To be continued).

NITIDULA BIPUSTULATA IN A NEW ROLE.

BY G. H. FRENCH, CARBONDALE, ILL.

One day last summer I received a letter from a physician in a town near Carbondale, stating that one of his patients had voided some live beetles, and asking me if I cared to see them. Assuring him that I did, he sent me several specimens of the species above mentioned. Not having this species in our collection, one of them was sent to Dr. F. M. Webster, Dept. of Agriculture, Washington, who identified it for me, but doubted its being an intestinal parasite.

Briefly stated, the history of the case is as follows: The man came to the doctor several days before his writing to me, stating that he had found the insects in his excreta. The doctor told him they must have come from the ground on which he had voided the excreta; and he further advised him to use a clean chamber next time. The next day the man came back to the doctor with a lot of the beetles, stating that he had done as directed, and that he passed as many as a tablespoonful of the beetles.

On talking with the doctor a few days ago, I find that the man has been voiding these beetles for some time, and that six years ago his son passed quantities of the same beetles. The son has since died of typhoid fever. The boy told his father about his passing them, and this led the latter to notice his own excreta. The beetles were voided alive, but soon died after crawling a little way from the excreta.

This is the first instance I have known, either from personal observation or from the literature, of adult insects being voided from the enteric canal of either a man or a related mammal.

(m) Kholodkovsky places this with 54.

(n) Spelt Ceratovacunna both in Zool. Record and Bericht der Entom., both of which give incorrect reference.

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